SHOUT
SHARE
IT

SBM
1015

BRITISH MUSEUM
27 OCT 1969
NATURAL HISTORY

# BULLETIN OF
# THE BRITISH MUSEUM
# (NATURAL HISTORY)

---

## ENTOMOLOGY
## VOL. XXIII
## 1969

BRITISH MUSEUM (NATURAL HISTORY)
LONDON: 1969

## DATES OF PUBLICATION OF THE PARTS

| | |
|---|---|
| No. 1 | 28 January 1969 |
| No. 2 | 28 January 1969 |
| No. 3 | 28 January 1969 |
| No. 4 | 11 April 1969 |
| No. 5 | 11 April 1969 |
| No. 6 | 13 May 1969 |
| No. 7 | 13 May 1969 |
| No. 8 | 13 May 1969 |

PRINTED IN GREAT BRITAIN
BY STAPLES PRINTERS LIMITED
AT THEIR KETTERING,
NORTHANTS, ESTABLISHMENT

# CONTENTS

## ENTOMOLOGY VOLUME XXIII

PAGE

No. 1. A revision of the genus *Telipna* Aurivillius (Lepidoptera : Lycaenidae). By T. H. E. Jackson 1

No. 2. Acridoidea of the Galapagos Islands (Orthoptera). By V. M. Dirsh 25

No. 3. Diptera from Nepal. Sphaeroceridae. By J. C. Deeming 53

No. 4. Revisional notes on African *Charaxes* (Lepidoptera : Nymphalidae) Part V. By V. G. L. van Someren 75

No. 5. A revision of the African species of *Pseudorhynchus* Serville (Orthoptera : Tettigoniidae). By D. R. Ragge 167

No. 6. Studies on Australian Muscidae (Diptera) II. A revision of the Tribe Dichaetomyiini Emden. By A. C. Pont 191

No. 7. A list of the Type-specimens of Odonata in the British Museum (Natural History) Part II. By D. E. Kimmins 287

No. 8. The Family-Group names of the scale insects (Hemiptera : Coccoidea). By D. J. Williams 315

Index to Volume XXIII 343

# A REVISION OF THE GENUS *TELIPNA* AURIVILLIUS (LEPIDOPTERA : LYCAENIDAE)

BRITISH MUSEUM
24 JAN 1969
NATURAL HISTORY

T. H. E. JACKSON

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 1
LONDON: 1969

BRITISH
24 JAN
NATURAL HIS

# A REVISION OF THE GENUS *TELIPNA* AURIVILLIUS (LEPIDOPTERA : LYCAENIDAE)

BY

T. H. E. JACKSON

*Pp.* 1–23: 5 *Plates*

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 1
LONDON: 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In* 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Vol.* 23, *No.* 1 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

*World List* abbreviation
*Bull. Br. Mus. nat. Hist.* (Ent.).

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued* 28 *January*, 1969 *Price Eighteen Shillings.*

# A REVISION OF THE GENUS *TELIPNA* AURIVILLIUS (LEPIDOPTERA : LYCAENIDAE)

*By the late* T. H. E. JACKSON*

## CONTENTS

| | Page |
|---|---|
| SYNOPSIS | 3 |
| INTRODUCTION | 3 |
| SYSTEMATICS AND TAXONOMY OF THE GENUS | |
| Group I | 4 |
| Group II | 16 |
| Species incorrectly placed to *Telipna* | 20 |
| ACKNOWLEDGMENTS | 21 |
| REFERENCES | 21 |
| INDEX | 22 |

## SYNOPSIS

The genus *Telipna* Aurivillius is revised and four new species and three new subspecies are described. All species are figured where possible.

## INTRODUCTION

A REVISION of the genus *Telipna* Aurivillius is long overdue and, in addition, many new species have been discovered since the publication of Seitz, *Macrolepidoptera of the World* (1914). An attempt is made here to bring the genus up-to-date.

Insufficient is known of the range and distribution of each species to erect subspecies and therefore, unless the affinity is obvious, all new forms are treated as species in this paper. The species divide into two natural groups on the pattern of the hind wing underside, as noted by Aurivillius, *in* Seitz, and this arrangement is followed here.

The genitalia, except in a few instances, e.g. *rothi* Grose-Smith, are not diagnostic.

The habits of *Telipna* are interesting. The habitat is floor-level, always in forest, along forest paths or in places where the undergrowth is not high, and heavy shade is always preferred. Here they sit, usually at the ends of small dead twigs, and fly short distances when disturbed, displaying the mimetic *Agaristid*-like pattern and settling again and " disappearing ". They are, therefore, easy to capture, but if missed for any reason, can fly fast right out of the area. They feed on plant sap from creeper tendrils, leaving as soon as the sun reaches the tendrils. The early stages are passed on the bark of trees, the larvae feeding on moss and lichens and are not associated with ants. The larvae are black and densely hairy, similar to those of *Balacra* Walker. The pupae are hidden under loose bark on the trunks or on stumps and dead wood nearby.

---

* We learned with regret that, whilst this paper was being set up by the printers, the author was murdered by intruders in his African home. *Editor.*

All types are in B.M.N.H., unless otherwise stated. In the following text there are several references to type material lodged in the Hamburg Museum. All this material is presumed, on good authority, to be destroyed and neotypes are designated where appropriate.

Note. In the descriptions of the fore wing underside all black marks, including the two apical, are treated as costal streaks.

## Group I

Hind wing beneath at the costal margin with two black transverse streaks proximal to the median streak.

### ***Telipna acraea*** (Doubleday, Westwood & Hewitson)

The three species or forms, *acraea* Doubleday, Westwood & Hewitson, *bimacula* Plötz and *albofasciata* Aurivillius, form a complex which is exceedingly difficult to unravel. The distributions are peculiar, i.e. *acraea*, west of the Niger in the true West African Zone, occurring as *echo* Grose-Smith & Kirby (subapical spots orange but not conjoined to the inner-marginal patch) in Ghana and elsewhere; *bimacula*, east of the Niger River in Calabar and Cameroons (ex. Brit.) and again in a slightly different form (ssp. *nigrita* Talbot) in Equateur and Kasai; *albofasciata*, type-series from Fernando Po flies with *bimacula* in the Cameroons, occurs in a rather different form in the Moyen Congo, without *bimacula* and again in a form, nearer the typical, around Coquilhatville.

On the distribution, therefore, the latter cannot be a subspecies of *bimacula* Plötz, as stated by Aurivillius, *in* Seitz and is here treated as a species.

On the other hand the affinities are obvious and there is little or no difference on the underside.

### ***Telipna acraea acraea*** (Doubleday, Westwood & Hewitson)

(Pl. 1, figs. 1, 5)

*Pentila acraea* Doubleday, Westwood & Hewitson, 1852 : 504, pl. 77, fig. 6.
Type: Ashanti.
*Liptena acraea* (Doubleday, Westwood & Hewitson) Grose-Smith & Kirby, 1887 : (1), pl. 1, figs. 5, 6.
*Telipna acraea* (Doubleday, Westwood & Hewitson) Aurivillius (*in* Seitz), 1914 : 301, pl. 61c.
*Liptena echo* Grose-Smith & Kirby, 1890 : 40, pl. X, figs. 4, 5.
*Telipna bimacula echo* (Grose-Smith & Kirby) Aurivillius (*in* Seitz), 1914 : 301, pl. 61d.

Subapical spots in the male as in *echo* Grose-Smith & Kirby and not conjoined to the discal patch. Spots red. Specimens occur lacking the red subapical spot altogether. See remarks under *semirufa*.

In the female the subapical and discal patches are always conjoined by a bar in 3, 4.

Distribution. Confined to the true W. African Zone.

### ***Telipna acraea conjuncta* ssp. n.**

(Pl. I, figs. 6, 2)

A well defined subspecies occurs in W. Nigeria, to the Niger River and Port Harcourt, differing from *acraea acraea* as follows:

♂ *Upperside.* Fore wing. The subapical spot is very large and is joined distally to the inner-marginal patch by a thin, sometimes thick, red bar. Rarely this spot is discrete.

♀ *Upperside.* Fore wing. The black costal area invades the orange postdiscal band as far as the base of space 3, leaving only a broad orange bar, joining the subapical to the inner-marginal patch. *Underside.* As in *acraea acraea.*

Holotype ♂. NIGERIA: Benin Prov., Ubiaja, viii.1955 (*T. H. E. Jackson*).

Allotype ♀. Same data as holotype.

Distribution. NIGERIA: Benin, Ubiaja, Owerri, Port Harcourt.

### ***Telipna acraea bimacula* (Plötz) comb. n.**

(Pl. I, figs. 3, 7)

*Pentila acraea* Doubleday var. *bimacula* Plötz, 1880 : 199.
Type: Ashanti.
*Telipna bimacula* (Plötz) Aurivillius (*in* Seitz), 1914 : 301, pl. 61c, d.
Type. Abo : März, Mungo : Mai. 2.
*Liptena fervida* Grose-Smith & Kirby, 1890 : 39, pl. X, figs. 1–3.
Types ♂ and ♀. Cameroons.
*Telipna fervida* (Grose-Smith & Kirby) Aurivillius, 1898 : 257.

The more eastern subspecies of *acraea*. Subapical spots small, yellowish and always divorced from the discal patch in the male. In the female, subapical spots usually also divorced, though connected by a thin yellow line, but sometimes indistinguishable from *acraea acraea*.

Judging from the figures in Grose-Smith & Kirby, 1890, *fervida* might be a separate species, but Aurivillius, 1898, who must have seen it, since it was in the Staudinger collection, sank it as a straight synonym of *bimacula*. I am informed by Dr. Hannemann that the types are lost and it seems best, therefore, to follow Aurivillius.

Distribution. NIGERIA: east of the Niger River; Calabar; CAMEROONS (ex Brit.). Holland, 1920, mentions a female from Niangara, Congo (ex Belge) which I am inclined to doubt, as also, a male at Tervuren from Congo (ex Belge), Haut Lomami, Kapanga, Kafakumba.

### ***Telipna acraea nigrita* ssp. n.**

(Pl. I, figs. 8, 4)

*Telipna acraea bimacula* ♀ f. *nigrita* Talbot, 1935: 70.

In Equateur and in Kasai (Congo, ex Belge) occurs a form of *acraea* which differs sufficiently to warrant a subspecific name. By courtesy of the Hope Dept., Oxford, two pairs of these have been examined and Talbot quotes eight females.

In the males the subapical spots are small and orange, always separated from the inner-marginal patch and in the females the latter is always confined below the cell.

Neallotype ♂. CONGO STATE, S.W. Upper Kasai R. Distr., 1908 (*Paul Laudbeck*). (Oxford).

Holotype ♀. CONGO (ex Belge); Haut Congo, Basankusu, Bongandanga, 9.iv.1928 (Talbot's type), (Oxford). This locality is in Equateur Province.

Distribution. CONGO (ex Belge): Equateur and Kasai.

### ***Telipna albofasciata*** Aurivillius

(Pl. 1, figs. 9, 13)

*Telipna albofasciata* Aurivillius, 1910 : 520.
Types. Fernando Po. (Genoa, no actual types were designated).
*Telipna bimacula albofasciata* Aurivillius; Aurivillius (*in* Seitz), 1914 : 301.
*Telipna albofasciata* Aurivillius; Stempffer, 1965 : 1450.

♂. Red areas very dark; discal patch in the type series confined below the cell, or just reaching the median; wide black border, three (or two) white subapical spots in 4, 5 and 6.

♀. Red areas more orange, restricted in the discal patch to the lower half of the cell; three white subapical spots conjoined into a bar and a small white streak in 7; very occasionally these spots are separate.

The type series consists of 4 ♂ and 3 ♀, all in Mus. Civ. di Stor. Nat., Genoa and all from Fernando Po.

The series from Moyen Congo differs in that the red discal area in fore wing of the male covers half the cell as in the female, and the white subapical spots are larger and broader. The underside is very similar to *acraea* and *bimacula*.

Distribution. FERNANDO PO; CAMEROONS; GABON; MOYEN CONGO: Etoumbi, Kelle; CONGO (ex Belge): Equateur; Coquilhatville, Lake Tumba, Eala.

### ***Telipna semirufa*** (Grose-Smith & Kirby)

(Pl. 1, figs, 14, 10)

*Liptena semirufa* Grose-Smith & Kirby, 1889 : 33, pl. VIII, figs. 5, 6.
Type. Gold Coast (Ghana).
*Telipna bimacula semirufa* (Grose-Smith & Kirby) Aurivillius (*in* Seitz), 1914 : 301, pl. 61d.

No subapical spots; discal and hind wing patches red, much as in *acraea* and confined below the cell.

It has been found that, at least in the Côte d'Ivoire, males of *Telipna acraea* (Doubleday, Westwood & Hewitson) can occur without the red subapical spot in fore wing above, thus closely resembling *semirufa*. There are, however, two unmistakeable characters separating the two species as follows—the male of *acraea* has the distal edge of red inner-marginal patch of fore wing above nearly straight and the fore wing submarginal black border below invaded by the yellow ground colour in spaces 3–5 inclusive. The male of *semirufa*, on the other hand, has the distal edge of red inner-marginal patch of fore wing above deeply incised between space 1 and 2 and the fore wing submarginal black border below entire. In the females the distal edge of the fore wing yellow patch is more crenulate in *acraea* and the submarginal black border of fore wing below differs as in the males. These characters can be plainly seen in Smith & Kirby's figure of the type of *semirufa*.

Distribution. Confined to the W. African Zone, i.e. west of the Niger River. Clench, 1965, is almost certainly correct in suspecting Aurivillius' locality of the Congo.

### ***Telipna rufilla*** (Grose-Smith & Kirby)

(Pl. 1, figs. 11, 15)

*Liptena rufilla* Grose-Smith & Kirby, 1901 : 133, pl. XXVIII, figs. 4, 5.
Type. ♂ Nigeria, Warri (unique).
*Telipna rufilla* (Grose-Smith & Kirby) Aurivillius (*in* Seitz), 1914 : 301.

Similar to *semirufa* Grose-Smith & Kirby, but with larger red areas, and differing below. The red area in fore wing covers most of the cell. ♀ unknown.

Aurivillius (*in* Seitz) placed this species to Group II, but it has nothing in common with *sanguinea* Plötz, *nyanza* Neave, etc. I think that the median costal streak on the hind wing below is placed a little more distad than usual and that *rufilla* belongs to Group I. It is peculiar that no further specimens of this species have been taken.

Distribution. NIGERIA: Warri, i.e. west of the Niger River in the true W. African Zone.

### ***Telipna rothi*** (Grose-Smith)

(Pl. 1, figs. 12, 16)

*Liptena rothi* Grose-Smith, 1898 : 353.
Type. Nigeria, near Warri.
*Liptena rothi* Grose-Smith; Grose-Smith & Kirby, 1901 : 133, pl. XXVII, figs. 1, 2, 3.
*Telipna rothi* (Grose-Smith) Aurivillius (*in* Seitz), 1914 : 301.

A well known and well defined species in which the genitalia also differ.

The subapical and discal patches in both sexes broadly conjoined.

Distribution. West of the Niger; GUINEA: Mt. Nimba; GHANA; NIGERIA: Warri, Benin, Lagos.

### ***Telipna citrimacula citrimacula*** Schultze

(Pl. 2, figs. 17, 12)

*Telipna citrimacula* Schultze, 1916: 141.
Type. Boenga, S.E. Cameroun. (Berlin).

All markings in both sexes orange; underside much more heavily marked than in the next subspecies.

The type of *citrimacula* Schultze was sent to me by Dr. Hannemann from Berlin. The type has no subapical spots but is otherwise identical above and below with *angustifascia* Joicey & Talbot. The lack of subapical spots is a common aberration and there is one here exactly similar, belonging to the Uganda subspecies from Budongo Forest, Uganda, and another from Eala at Tervuren. There is no doubt that these two subspecies are conspecific.

Distribution. CAMEROONS: Bitje, Djah River; Boenga; CONGO (ex Belge): Equateur; Eala, Paulis; Coquilhatville.

Note: Monsieur Stempffer states that Schultze's type of *citrimacula* was in the Hamburg Museum and therefore was probably destroyed, but the specimen, received from Dr. Hannemann in Berlin, was clearly labelled and must be the type.

### ***Telipna citrimacula angustifascia*** (Joicey & Talbot) **comb. n.**

(Pl. 2, figs. 18, 22)

*Telipna angustifascia* Joicey & Talbot, 1921 : 77, pl. XIV, fig. 43.
Type ♂. Bafwaboli, Congo (ex Belge).
Type ♀. Kasai, Congo (ex Belge).

The name *angustifascia* may be used for the population in the eastern Congo to Kasai, and western Uganda. It is intermediate between typical *citrimacula* and the Uganda subspecies *neavei* Baker.

In the male the subapical spots are larger than in the typical race and in the female the hind wing patch is yellowish, as also the subapical spots of fore wing.

Distribution. E. CONGO (ex Belge): from Kibale-Ituri to Kasai; Kasai; Equateur; Kibale-Ituri; Bafwaboli, Beni, Irumu; W. UGANDA: Budongo, Bwamba, etc.

### ***Telipna citrimacula neavei*** Baker **stat. n.**

(Pl. 2, figs. 19, 23)

*Telipna neavei* Baker, 1926 : 386.

Baker's *neavei* is merely a form in which the subapical patch is usually separated, but sometimes conjoined to the discal area. It occurs commonly in all populations in Uganda, and it is impossible to separate the two forms, but as it was described as a species, the name *neavei* must be used for the eastern subspecies.

Ssp. *neavei* differs from typical *citrimacula* in that the subapical spots in the fore wing of the male are larger and all spots in the female are pale yellow; in *citrimacula* they are orange. The subapical spots in the fore wing may be missing or small in all subspecies. The normally red areas in the male are bright orange.

This is the race from eastern Uganda: Kampala, Mabira, Mpigi, Kamengo.

Type ♂, ♀. E. UGANDA: Budongo Forest, Unyoro, 3,400 ft.

Distribution. E. UGANDA: In all forested areas.

## ***Telipna sheffieldi*** Baker

(Pl. 2, figs. 20, 24)

*Telipna sheffieldi* Baker, 1926 : 387.
Type: Uganda, Toro, Mpanga Forest.

The subapical patch is much longer and broader than in *citrimacula* Schultze and the underside differs as can be seen in the plate, particularly in the first costal streak in hind wing, which is bent distad in all examples.

Distribution. Known only from UGANDA: Toro, Mpanga Forest (= Kibale Forest).

## ***Telipna aurivillii*** Rebel

(Pl. 2, figs. 29, 25)

*Telipna aurivillii* Rebel, 1914 : 262.
Type ♂. Congo (ex Belge): Mawamba (*Grauer*). (Vienna).
*Telipna rothioides* Holland, 1920 : 214, pl. XII, fig. 7, **syn. n.**
Type ♀. Medje (Amer. Mus. Nat. Hist., New York).

A large species, not very similar to any other. In the male pale orange with broad subapical band, conjoined to the discal area, in the female pale yellow.

Photos of the types have been received through the kindness of Dr. Kasy in Vienna. The locality Mawamba is in the north-eastern Congo (ex Belge). The types were collected by Grauer.

The figure of the female of *rothioides*, given by Holland, agrees exactly with the photo of the female of *aurivillii* Rebel from Vienna, except that the former shows some white markings along the fore wing costa below. It is significant that Holland, who was a very careful observer, makes no mention of these white markings in his description; he merely compares *rothioides* with *rothi* Grose-Smith, which has no white at all. Otherwise his figure agrees exactly with the female of *aurivillii*, and in the author's opinion there is no doubt they are synonymous.

Distribution. MOYEN CONGO: Souanke; CONGO (ex Belge): Kasai; Lulua; Kibale-Ituri; Mawamba, Beni, Irumu; Equateur; Coquihatville, Eala, Paulis.

## ***Telipna aurivillii jefferyi* ssp. n.**

(Pl. 2, figs. 26, 30)

Differs from the nominate subspecies by the much wider bands in fore wing, particularly in the female. In *jefferyi* the band at vein 2 is 8 mm. wide in the male, and 10 mm. wide in the female. In *a. aurivillii* these same bands are only 4 mm. wide, in both sexes.

Holotype ♂. UGANDA: Budongo Forest, ix 1934 (*T. H. E. Jackson*).

Allotype ♀. Same data, viii.1958.

Named after the pioneer G. W. Jeffery, who was one of the first to capture this species.

Distribution. UGANDA: In all forests.

### ***Telipna sulpitia*** Hulstaert

(Pl. 2, figs. 31, 27)

*Telipna sulpitia* Hulstaert, 1924 : 114.
Type ♀. Haut Uele, Madyu. (M.R.A.C., Tervuren.)

The type of this species was kindly sent me by Monsieur L. Berger from Tervuren and proves to be conspecific with examples from the N.E. Congo to S. Sudan, which have long remained unnamed in B.M.N.H. The male has not been described.

♂. *Upperside.* Fore wing. Black, with red inner marginal area covering about half the cell and extending well over half way in 1 and 2; three smallish, whitish yellow submarginal spots. Hind wing. Red area covers most of the wing leaving a black marginal border 3 mm. wide. *Underside.* As in the female. Length of fore wing 2 mm.

Neallotype ♂. S. SUDAN: Tembura, xii.1922 (*Janson*).

In the ♀ the subapical band may occasionally be divorced from the discal patch by a broad black line, part of which is always present.

Distribution. N.E. CONGO (ex Belge): Haut Uele, Madyu; S. SUDAN: Yambio, Tembura, Aza Forest.

### ***Telipna villiersi*** Stempffer

(Pl. 2, figs. 28 and 32)

*Telipna villiersi* Stempffer, 1965 : 1450–52.
Type ♂. Rep. du Congo. Sibiti. (Muséum national de Histoire naturelle, Paris.)

Allied to *acraeoides* Grose-Smith and Kirby and *kayonza* sp. n., but smaller and underside heavily marked as in *kelle* sp. n.; red areas more orange. The female has not been described.

♂, ♀. Eyes black; palps black with traces of white scaling; frons black with two white lateral spots; legs black with large white spots at the joints; antennae black above, checkered white below; abdomen red with brown extremity ♂, brown ♀.

♀. *Upperside.* Fore wing. Three white subapical spots in 4–6, broad and conjoined, a very small white spot in 7. Otherwise as in the male. *Underside.* Markings, which are the same as in the male, show through above in both sexes, and the cilia are only minutely white spotted.

Length of fore wing; ♂ 21 mm.; ♀ 23 mm.

Note. The subapical white spots in the male may be conjoined into a bar as in the type or divided into 3 separate white spots.

Neallotype ♀. RÉP. DU CONGO: Moyen Congo, Kelle, x.1963 (*T. H. E. Jackson*).

Distribution. RÉP. DU CONGO: Moyen Congo, Sibiti, Kelle, Etoumbi, Mayoumba; CONGO (ex Belge): Sankuru.

## *Telipna cameroonensis* sp. n.

(Pl. 3, figs. 33, 37)

Nearest to *atrinervis* Hulstaert, but smaller and with white subapical spots in fore wing.

A small weak species, flying with the common robust *Acraea bimacula* Plötz in an obviously protective association.

♂, ♀. Eyes black; palps black; frons black, bordered white; legs black, white on the joints; antennae black above, checkered white below.

♂. *Upperside*. Fore wing. Black with dark red basal and discal patch, not quite covering the cell and leaving a wide black border even in space 1; up to three very small white subapical spots, sometimes two only, or one, or rarely, absent altogether. Hind wing. The red discal area is restricted, leaving a wide black border of 3 mm.

*Underside*. Fore wing. Seven costal streaks, that proximal to the subapical spots being long and broad; margin narrowly black with white spots in each cellule, slightly wider in 1 and 2. Hind wing. Two black proximal costal streaks, all narrow; a wide black border enclosing two rows of white marginal and submarginal spots.

♀. *Upperside*. Fore wing. Red areas orange, completely covering the cell and leaving only a very narrow black costal margin; three white subapical spots. Hind wing. As in the male. *Underside*. As in the male.

Cilia checkered white in both sexes.

Length of fore wing; ♂ 20 mm.; ♀ 25 mm.; the size is variable and there are much smaller specimens and an occasional larger.

Holotype ♂. CAMEROONS (ex Brit.): Mamfe, vii.1965 (*T. H. E. Jackson*).

Allotype ♀. Same data, x.1956.

Distribution. CAMEROONS (ex Brit.): Mamfe, Victoria; NIGERIA: Calabar Prov., Ndebiji.

## *Telipna atrinervis* Hulstaert

(Pl. 3, figs. 38, 34)

*Telipna atrinervis* Hulstaert, 1924 : 113.
Type ♀. Kamerun : Bitje. (M.R.A.C., Tervuren).
*Telipna ja* Baker, 1926 : 388, **syn. n.**
Type ♂, ♀. Bitje, Ja River.
*Telipna venanigra* Baker, 1926 : 387, **syn. n.**
Type ♂. Bitje, Ja River.

The types of all the above have been examined and are considered to belong to the same species. The differences are small and well within the legitimate limits in any given species; moreover they all come from the same place and the differences are all present in a series from Moyen Congo before me. One of the main differences between *ja* Baker and *venanigra* Baker is the presence, in both sexes on the underside in the longest and most distal costal black bar on the fore wing, of a large quadrate black spot in space 3 of the former and its absence in the latter, but in the series from Moyen Congo there is every variation in this spot, from large to complete absence.

A larger more robust species, completely lacking the apical spots in the male.

In the female three subapical spots, white or pale yellow, sometimes small, sometimes a bar. The red ♂ or orange-yellow ♀ areas are restricted; in the male only covering half the cell of the fore wing or less and in the female not reaching the upper discocellular and often with one or two black costal spots invading the cell.

The holotype ♂ of *venanigra* Baker becomes the neallotype ♂ of *atrinervis* Hulstaert.

Distribution. CAMEROON: Bitje; RÉP. DU CONGO: Moyen Congo; Etoumbi, Kelle, Impifondo; CONGO (ex Belge): Kapanga.

### ***Telipna transverstigma*** H. Druce

(Pl. 3, figs. 39, 35)

♀ *Telipna transverstigma* H. Druce, 1910 : 356, Pl. XXXIII, fig. 2.
Type. S.E. Cameroons : Bitje.
*Telipna transverstigma* Druce; Aurivillius (*in* Seitz), 1914 : 302, pl. 63a.

Red areas restricted in fore wing and not covering the cell, but in hind wing covering most of the wing, leaving only a narrow black border; subapical white spots broad and united into a bar in both sexes. On the underside 2 black, proximal costal spots in hind wing and in addition a black streak, nearly horizontal, across the base of 1.

Note. Aurivillius placed this species (in the author's opinion incorrectly) to his Group II.

The male has not been described.

♂. *Upperside.* Fore wing. Red area covers two thirds of the cell, then slopes obliquely, distally ending squarely from midway space 2 to the anal angle; costa narrowly black with a black spot entering the red area about midway along the cell; a prominent white subapical bar in 4, 5 and 6. Hind wing. Entirely red, except for a narrow black border about 1½ mm. wide. *Underside.* As in the female; the two black bars running at right angles from the inner margin of the hind wing very prominent.

Length of fore wing; the three males and one female before me, all from Moyen Congo, are smaller than the female figured by Druce and reproduced in Seitz; ♂ 18 mm., ♀ 21 mm.

Neallotype ♂. RÉP. DU CONGO: Moyen Congo; Kelle. x. 1963 (*T. H. E. Jackson*).

Distribution. CAMEROONS: Bitje; RÉP. DU CONGO: Moyen Congo; Kelle.

### ***Telipna lotti*** **sp. n.**

(Pl. 3, figs. 36, 40)

*Telipna bimaculata* [*sic*]. No author. Wilson, 1953 : 96, pl. 15. [mis-spelling of *bimacula* Plötz.]

Allied to *albofasciata* Aurivillius, but much larger.

♂, ♀. Eyes black; palps black; frons black with white lateral margins; legs black, white at the joints; antennae black above, faintly checkered white below.

♂. *Upperside.* Fore wing. Black; red discal patch restricted, covering only half the cell and leaving a black distal margin 2 mm. wide in 1 and 3 mm. in 2; white subapical spots in 4–6, those in 4 and 5 broad, that in 6 small or absent. Hind wing. Red basal and discal patch rather restricted, leaving a black marginal border 4 mm. wide; underside markings show through. *Underside.* As in *albofasciata*; eight costal streaks in fore wing and two in hind wing, proximal to the median streak.

♀. *Upperside.* Fore wing. Black; orange-red discal patch as in the male, but covering more of the cell and with two black costal spots invading it, one at cell end and one mid cell; white subapical spots in 4–6 and a streak in 7, very broad and conjoined. Hind wing. As in the male. *Underside.* As in the male.

Cilia in both sexes faintly checkered white.

Length of fore wing; ♂ 25 mm.; ♀ 29 mm.

Holotype ♂. S. SUDAN: Lotti Forest (*T. H. E. Jackson*).

Allotype ♀. Same data.

Distribution. Known only from the type locality.

## ***Telipna hollandi*** Joicey & Talbot

(Pl. 3, figs. 41, 44)

*Telipna hollandi* Joicey & Talbot, 1921 : 80, pl. XIV, figs. 46, 47.
*Telipna exsuperia* Hulstaert, 1924 : 112.
Type. Congo (ex Belge): ♂ Beni; ♀ Kasai.

A large species with three white subapical spots in male and extensive red areas. In the female the subapical white spots are very large and joined into a bar and the red area in hind wing reaches within 4 mm. of the margin. Two proximal costal streaks in hind wing below; the red areas in fore wing reach almost to the costa, leaving only a narrow black margin.

Distribution. CONGO (ex Belge): Kasai, Kibali-Ituri; Beni.

## ***Telipna kelle* sp. n.**

(Pl. 3, figs. 42, 45)

Nearest to *hollandi* Joicey & Talbot, differing as follows; red areas very dark in both sexes.

♂. *Upperside.* Fore wing. Subapical white spots as in *hollandi*; red area more extensive, reaching nearly to the margin in 2, and further beyond the cell; a thick black stigma in the red patch at the cell end. Hind wing. The red areas are less extensive, reaching only to 3 mm. from the margin; in *hollandi* 2 mm.; three white submarginal spots as in *hollandi*.

*Underside.* Fore wing. Much as in *hollandi*, but hind wing red area much narrower, leaving a black border 4 mm. wide, as against 2–3 mm. in the latter; costal streaks as in *hollandi*, but broader, the whole underside being darker.

♀. *Upperside.* Subapical white spots not much larger than in the male in fore wing, otherwise differing as in the male; red areas darker than in *hollandi*. *Underside.* Differs as in the male, only the reduction of the red patch in hind wing is even more striking.

Length of fore wing; ♂ 23 mm.; ♀ 25 mm.

Holotype ♂. RÉP. DU CONGO: Moyen Congo, Kelle, x.1963 (*T. H. E. Jackson*).

Allotype ♀. Same data.

Distribution. RÉP. DU CONGO: Moyen Congo: Kelle, Ketta.

### ***Telipna acraeoides*** (Grose-Smith & Kirby)

(Pl. 3, figs. 43 and 46)

*Liptena acraeoides* Grose-Smith & Kirby, 1890 : 39.
♂ *Liptena sanguinea* (Plötz) Grose-Smith & Kirby, 1889; 2, pl. 1, figs. 1 & 2.
*Liptena acraea* Doubleday, Westwood & Hewitson; Hewitson, 1866, 3 pl. 60, fig. 12.
Type: Angola.
♀ *Telipna acraeoides* (Grose-Smith & Kirby) Aurivillius (*in* Seitz), 1914 : 301, pl. 61d.

This species has been often confused, but a photo of the type male and two more males and two females have been received from B.M.N.H. and there is no longer any doubt as to its identity. It is a good species, apparently confined to N. Angola.

The most important characters are: large species; subapical spots in male 3, of equal size and well separated in 4, 5 and 6. In female large, broad, finely separated by the veins and an extra streak in 7; red areas cover most of the cell in both sexes; prominent white submarginal spots in hind wing above; below; costal streaks finer than usual and an extra series of black spots in hind wing in the bases of 1, 2 and 3, one or other of which may be missing, but always two.

The series of five in B.M.N.H. are remarkably constant.

The figure of the female in Seitz is a good one and shows the large size and the hind wing spots showing through from below. N. H. Bennett states there are none from other localities in B.M.N.H. but that there are a further two males and eight females from Angola.

The type female is missing, but no neotype is designated, since the type is probably one of those in the series.

Distribution. ANGOLA: Canhoca, N'dalla Tando.

Note. There is a note in Talbot's handwriting under the male type saying; "This must be the ♂ type vide Rhop. Exot. Lyc. Afr. p. 39 (1890) = specimen figured as *sanguinea* ♂ Lyc. Afr. pl. 1 : figs. 1, 2 (1889)".

### ***Telipna kayonza*** **sp. n.**

(Pl. 4, figs. 47, 50)

Allied to *acraeoides* (Grose-Smith & Kirby), and to *villiersi* Stempffer but lighter below.

♂, ♀. Eyes black; palps black; frons black with white lateral lines; legs black, small white spots at the joints; antennae black above and below.

♂. *Upperside.* Fore wing. Black, with large red basal and discal area; three white subapical spots in 4–6, that in 6 sometimes missing and always smaller; red area to cell end and covering the base of 3 and most of 1 and 2, but not beyond the upper discocellular; black costal border, a little over 1 mm. wide. Hind wing. The red area reaches to within 2 mm. of the margin, hence a narrow black border with no white submarginal spots; the underside costal streaks show through.

*Underside*. Fore wing. Reddish yellow; five black costal streaks and a dot in the base, all short except that proximal to the subapical white spots, which outlines these and is prolonged by a spot in 3; narrow black margin, interrupted by the veins. Hind wing. Two fine black proximal costal streaks, black margin narrow with two rows of white spots, but the submarginal spot in 3 covered by the ground colour.

♀. *Upperside*. Fore wing. As in the male but white subapical spots broad and conjoined and a white streak in 7; a fine black stigma at cell end. Hind wing. As in the male.

*Underside*. As in the male.

Length of fore wing; ♂ 24 mm.; ♀ 27 mm.

N. H. Bennett has examined the genitalia of this species and compared it to that of *acraeoides* (Grose-Smith & Kirby). He states that although very complicated and difficult to describe, it is quite different from *acraeoides*.

Holotype ♂. UGANDA: Kigezi, Kayonza, v.1954 (*T. H. E. Jackson*).

Allotype ♀. Same data, vii.1952.

Distribution. Only W. UGANDA: Kigezi, Kayonza; Ankole, Kalinzu Forest.

## ***Telipna plagiata*** Joicey & Talbot

(Pl. 4, figs. 48, 51)

*Telipna plagiata* Joicey & Talbot, 1921 : 79, pl. XIV, figs. 44, 45.

Type ♀. Lower Butahu River, Semliki Valley, Congo (ex Belge).

Distinguished particularly by the heavily white spotted cilia between the veins. A large species. Red areas cover all of cell and in female almost to costa.

The male has not been described.

♂. Eyes black; palps black; frons black, centrally white; legs black, white at the joints; antennae black above, checkered white below; abdomen rufous.

*Upperside*. Fore wing. Black; three small white subapical spots in 4–6; red inner marginal patch from margin to upper discocellular, extending over most of space 1, three-quarters of 2, half of 3 and the base of 4. A small black triangular spot of ground colour at the cell end. Hind wing. Black with large red area covering whole wing to within 3 mm. of the margin. Cilia of both wings heavily spotted white in the interspaces.

*Underside*. Fore wing. Reddish yellow with six black costal streaks and the white subapical spots showing through; margin spotted black with two very small white streaks in 1 and 2. Hind wing. Of the usual pattern; two black proximal costal streaks; a double row of white spots in the black margin; red discal and postdiscal area reaching the margin in 5 and 6, centrally whitish from costa to beyond cell; a small black streak on the inner margin in the base of 1.

Length of fore wing; 25 mm.

Neallotype ♂. CONGO (ex. Belge); Ituri, Beni, (Kivu), iii.1947 (*T. H. E. Jackson*).

Distribution. CONGO (ex Belge): Kibale-Ituri; Semliki Valley, Beni, Itoa River.

## Group II.

Hind wing below at the costal margin with one black transverse streak, proximal to the median streak.

### ***Telipna sanguinea sanguinea*** (Plötz)

(Pl. 4, figs. 49, 52)

*Pentila acraea* var. *sanguinea* Plötz, 1880 : 198.
Type: Victoria (Berlin?).
*Liptena anneckei* Dewitz, 1886 : 427, pl. II.
Type: Mukenge.
*Liptena sanguinea sanguinea* (Plötz) Grose-Smith & Kirby, 1887 : 2, pl. I, figs. 3, 4.
*Telipna mariae* Dufrane, 1945 : 112 [♀], **syn. n.**
Type ♀: Congo (ex Belge): Kivu; Kamituga.
*Telipna sanguinea* f. *bistrigata* Aurivillius, 1925 : 7.

A well known species with a subspecies in Uganda; subapical white spots variable but usually large, especially in the female, the spot in 4 occasionally absent or very small; one proximal costal streak in hind wing below. The type of *mariae* Dufrane has been received through the kindness of Monsieur L. A. Berger and the Director of I.R.S.N.B., Brussels. It is a typical female of *sanguinea* Plötz. The type of f. *bistrigata* Aurivillius has also been received from the Naturhistoriska Riksmuseum, Stockholm; the fore wings in this specimen are badly rubbed, but from the hind wings it appears to be a normal male of *sanguinea*. The underside also is typical. It came from north of Lake Edward. The " rubbing " in the fore wings may be due to lack of pigment on emergence from the pupa.

Distribution. NIGERIA: Calabar, Ikoni; CAMEROONS: Mamfe, Victoria; CONGO (ex Belge): Kibale-Ituri, Epulu, Beni, Kamituga; Eala, Equateur; Paulis; Uele, Haut Lornarni; Kapanga; Lake Edward.

### ***Telipna sanguinea depuncta*** Talbot

(Pl. 4, figs. 53, 56)

*Telipna sanguinea depuncta* Talbot, 1937 : 59.
Type ♂: Uganda, Tero Forest, Buddu; ♀: Mpanga Forest, Toro.

Distinguished by the much larger white subapical spots in both sexes; in the female these are broad and rounded, about 3 mm. wide.

Distribution. UGANDA: all forested areas.

### ***Telipna medjensis*** Holland

(Pl. 5, fig. 61)

*Telipna medjensis* Holland, 1920 : 214, pl. XII, fig. 8 [♀].
Type: Congo (ex Belge), Kibale-Ituri; Medje. (Carnegie Museum, Pittsburg).

This species seems to belong to Group II. The ♀ type is unique, but from the figure and description it is a good species. On the underside fore wing as stated by

Holland, " the entire apical region, save immediately on the costa, is immaculately yellowish red ". This is not the case in any other species known to me. Further there is only one costal streak in the fore wing below, that proximal to the white subapical spots.

Distribution. CONGO (ex Belge): Kibale-Ituri; Medje; only known from the type.

### ***Telipna nyanza*** Neave

(Pl. 4, figs. 54, 57)

*Telipna nyanza* Neave, 1904 : 335, pl. 1, fig. 19.
Type: Entebbe. (Hope Department, Oxford).

Red areas very large as in all this group, leaving, on fore wing, only a very narrow black costal border and on hind wing a black marginal band of only 2 mm. Subapical spots of fore wing small, that in 4 very small or absent, that in 6 shifted basad as in *ruspiniodes* Schultze and *katangae* Stempffer, a small white streak in 7; one proximal costal streak in hind wing below.

Distribution. CONGO (ex Belge): Lubudi and Lufupa Rivers; UGANDA: All forests.

### ***Telipna erica*** Suffert

(Pl. 4, figs. 55 and 58)

*Telipna erica* Suffert, 1904 : 41.
Type ♀: Cameroon, Barombi (Berlin.)
*Telipna erica* Suffert; Aurivillius (*in* Seitz), 1914 : 302, pl. 61e.
*Telipna acraea* ♀, f. *nigra* Suffert, 1904 : 42.

The type of this species was examined through the kindness of the authorities in Berlin. It is a female and differs from all other species by the large white marginal spots on fore wing above and by the very short costal streaks on hind wing below, of which there are two including the median. On hind wing above two rows of white spots, marginal and submarginal.

A male of this apparently very rare species was received from Moyen Congo and is described as under:

♂. *Upperside*. Fore wing. Black, with three white subapical spots in 4–6, that in 6 being the largest; a white streak in 7; red area large, leaving only a narrow black costal border and almost reaching the margin in 1; a fine black stigma at cell end. Hind wing. As in the female, a double row of white spots marginal and submarginal. *Underside*. Agrees well with the female, two costal streaks hind wing, all very short.

Length of fore wing; 22 mm.

Neallotype ♂. RÉP. DU CONGO: Moyen Congo, Kelle, x.1962. (*T. H. E. Jackson*).

A specimen has been received recently by request from Berlin of *Telipna acraea* ♀. f. *nigra* Suffert. It bears on the bottom of the pin an M.S. label stating, " Type, *Telipna acraea* f. *nigra* Suffert ". Higher up on the pin is another M.S. label, "*Telipna erica* Suffert. Type", and a red Type label with no number. The type of *erica*, a female, has already been received from Berlin and photographed and this specimen does not differ in any way from the type, moreover it comes from the same place, i.e. Cameroon: Barombi. The synonomy above is given on the strength of this specimen which is the only one which can be found in Berlin, but it is possible that this is not Suffert's ♀ f. *nigra*.

Distribution. CAMEROONS: Barombi (*Preuss*); RÉP. DU CONGO: Moyen Congo, Kelle.

### ***Telipna consanguinea consanguinea*** Rebel

(Pl. 5, figs. 59, 62)

*Telipna consanguinea* Rebel, 1914: 262.
Type ♂: Congo (ex Belge), Beni. (Vienna).
♀ *Telipna consanguinea* Rebel; Schultze, 1923 : 1150.
Type ♀: Sud-Kamerum, Molundu. Probably destroyed in Hamburg.
*Telipna consanguinea* ab. ♀ *exstincta* Schultze, 1923 : 1150, fig. 49.
Type ♀: Moyen Congo, Ouesso—probably destroyed in Hamburg.

Red areas very dark above and below; two white subapical spots above in fore wing, in 5 and 6, occasionally, in the female, a small white streak in 7, all spots well separated; one costal streak proximal to the median streak in hind wing below. A photo of the type ♂ has been examined, through the courtesy of Dr. Kasy, in Vienna, and it agrees exactly with the species so named in the author's collection and in B.M.N.H., except that the white apical spots are inclined to be larger in Ugandan specimens.

The female was described by Schultze from S. Cameroon. I have not seen this specimen and it is possible that it does not belong; a description of the true ♀ is given below.

♀. *Upperside*. Fore wing. Red areas slightly larger than in the male; two white subapical spots a little larger than in the male; hind wing as in the male. A replacement *Neallotype* is designated.

Length of fore wing; 25 mm.

Neallotype ♀. UGANDA: Mpanga Forest, Mpigi, iv.1959 (*T. H. E. Jackson*).

Distribution. CONGO (ex Belge): Equateur; Eala, Kibale-Ituri; Lake Tumba; Beni; UGANDA: Bwamba.

Note. The specimen, a male, allocated here from Lake Tumba, appears to belong to this species, but differs as follows; it is larger and darker above and below; on the underside the black patch containing the white subapical spots is larger and the costal hind wing streaks are larger and thicker.

The specimens from the localities cited by Schultze in S. Cameroon have not been examined. They were probably in Hamburg and have been destroyed, and the locality sounds most unlikely. ♀ ab. *exstincta* was said to differ by the reduction of the triangular costal streak in fore wing below.

### ***Telipna consanguinea ugandae*** Baker **comb. n.**

(Pl. 5, figs. 60, 63)

*Telipna erica ugandae* Baker, 1926 : 388.
Type: Uganda, Toro.

This insect is a subspecies of *consanguinea* Rebel and has nothing to do with *erica* Suffert. It is distinguished by the larger subapical spots, especially in the female, in which they are united into a broad band.

Distribution. UGANDA: all forests except Bwamba where the nominate subspecies occurs.

### ***Telipna katangae*** Stempffer

(Pl. 5, figs. 64, 66)

*Telipna katangae* Stempffer, 1961 : 9.
Types: Congo (ex Belge), Kapanga. (coll. Stempffer, Paris).

Very similar to *consanguinea* Rebel differing as follows; three subapical spots in 5–7, with a minute dot in 4, that in 6 shifted basad out of line; cilia more conspicuously white, so that in hind wing there are two rows of white spots, marginal and submarginal; slightly larger than *consanguinea*; underside very similar, but distal black margin in fore wing enlarged in 1 and 2, enclosing two triangular spots of the ground colour.

A small series from near Coquilhatville appear to belong here.

Distribution. CONGO (ex Belge): Haut Lomami; Kapanga, Sandoa; Equateur; Kafakumba, Coquilhatville, Lake Tumba, Paulis, Eala.

### ***Telipna ruspinoides*** Schultze

(Pl. 5, figs. 65, 67)

*Telipna ruspinoides* Schultze, 1923 : 1151, fig. 50.
Type: Süd-Kamerun, Owöng.

Similar to *katangae* Stempffer, but subapical white spots in fore wing large in 4–6, occasionally a trace of a streak in 7 in the female, the large spot in 6 shifted basad out of line; cilia very conspicuously white; on the underside the first costal streak is divided into two spots.

Schultze based this species on two examples (♂) from Owöng and Kom Fëlle in S. Cameroon, but did not fix a type. As these specimens were probably destroyed in Hamburg a NEOTYPE male is proposed here.

The female has not been described.

♀. Fore wing costal band narrower than in the Neotype ♂ and not invading the cell. Hind wing marginal band broader than in the ♂, the orange-red area more angled towards the outer margin.

NEOTYPE ♂. CAMEROONS: Bitje, Ja River, dry season (*G. L. Bates*).

Neallotype ♀. FR. EQUAT. AFR.: Moyen Congo, Feb., 1959 (*T. H. E. Jackson*).

Distribution. CAMEROONS (ex Brit.): Mamfe; NIGERIA: Calabar, Ndebije; S. CAMEROON: Owöng, Kom Fëlle.

Note. In Peters' Check List, 1952, there are two entries which are quite inexplicable; p. 91, *Telipna acraea* f. *rothi* Grose-Smith and *Telipna erica parva* Kirby. The former is a good species and the latter is the eastern subspecies of *Ptelina carnuta* Hewitson, *parva* is mentioned again in its correct place. I have been unable to find the following; *acraeoides laplumei* Devos, 1919.

## Species incorrectly placed to *Telipna.*

### ***Ptelina carnuta*** Hewitson

*Pentila carnuta* Hewitson, 1873 : 125
Type: Gabon.
*Telipna carnuta* (Hewitson) Aurivillius (*in* Seitz), 1914. Pl. 61e.
*Ptelina carnuta* (Hewitson) Clench, 1965 : 271–273.
*Durbania carnuta* (Hewitson) Grose-Smith & Kirby, 1895 : 91, Pl. XXI, figs. 1, 2.
*Telipna kamitugensis* Dufrane, 1945.
Type: Congo (ex Belge), Kamitugu.

The type of *Telipna kamitugensis* Dufrane has been examined through the courtesy of the Director of I.R.S.N.B., Brussels. It lacks an abdomen, but appears to be a male of *Ptelina carnuta* Hewitson. Above it is typical of this species, but has a small black discocellular spot on hind wing above, present also in a female in this collection. Below the hind wing marginal band is broader, but I do not think this is more than an individual variation.

### ***Ptelina carnuta parva*** (Kirby)

*Liptena parva* Kirby, 1887 : 362.
*Liptena parva* Kirby; Grose-Smith & Kirby, 1888 : 15, figs. 1–4.

### ***Ptelina subhyalina*** (Joicey & Talbot)

*Telipna subhyalina* Joicey & Talbot, 1921 : 78.

### ***Telipna actinotina*** Lathy

*Telipna actinotina* Lathy, 1903 : 194.
Type: Nigeria, Ogruga.
*Telipna actinotina* Lathy Aurivillius (*in* Seitz), 1914, Pl. 62a.
*Acraea actinotina* (Lathy) Peters, 1952 : 88.

T. G. Howarth of the B.M. N.H. states that Lathy misplaced the species and this was apparently corrected by Neave, according to a label in the collection, who placed it to the genus *Acraea*. Peters gives the date as 1915 for this correction, but no reference to this can be found. Three examples of this rare species were taken by Mr. R. G. T. St. Leger in December, 1959 at Ahoda, E. Nigeria.

### ***Pentila rogersi*** (H. Druce)

*Telipna rogersi* H. Druce, 1907 : 78.
Type: 14 m. from Mombasa, Rabai. (Oxford.)
*Pentila rogersi* (H. Druce) Stempffer, 1954 : 7–8.
*Telipna rogersi* H. Druce; Aurivillius (*in* Seitz) 1914 : 302.

This species is now in *Pentila*.

## ACKNOWLEDGEMENTS

My thanks are due to Monsieur L. A. Berger of M.R.A.C., Tervuren, the Director, I.R.S.N.B., Brussels, and to Dr. H. Hannemann of Berlin for the loan of their types; to Dr. F. Kasy of Vienna for photographs of their types; to the Director, Naturhistoriska Riksmuseum, Stockholm for the loan of the type of *sanguinea bistrigata* Aurivillius; to the Director, Mus. Civico Storia Nat., Genoa, for photographs of the series of *Telipna albofasciata* Aurivillius; to the Curator, University Museum, Oxford. Without the co-operation of the above this paper could not have been written. To the Keeper and staff of the B.M.N.H. and particularly to Captain N. D. Riley, C.B.E., T. G. Howarth, G. Tite, and N. H. Bennett for much help in arranging the plates, completing the distributions etc.; and finally to Monsieur H. Stempffer of Paris for reading and correcting this paper.

## REFERENCES

AURIVILLIUS, C. 1898. Rhopalocera aethiopica. *Öfvers. K. VetenskAkad. Förh.* **31** (5), 561 pp., figs.

—— 1910. Schmetterlinge gesammelt in Westafrika von L. Fea in dem Jahren 1897–1902. *Annali Mus. civ. Stor. nat. Giacomo Doria* (3) **4** : 494–530.

—— 1914. *In* SEITZ, *Macrolepidoptera of the World* **13**. Stuttgart.

—— 1925. Zoological Results of the Swedish Expedition to Central Africa 1921. Insecta. 12. Lepidoptera. *Ark. Zool.* **17a** (32) : 1–20.

BAKER, G. T. B. 1926. Descriptions of new species of Rhopalocera from the Ethiopian Region. *Ann. Mag. nat. Hist.* (9) **17** : 384–402.

DEWITZ, H. 1886. Neue westafrikanische Tagsschmetterlinge. *Dt. ent. Z.* **30** (2) : 427–430.

DOUBLEDAY, E., WESTWOOD, J. O. & HEWITSON, W. C. 1846–1852. *The genera of diurnal Lepidoptera.* London : 534 pp., figs.

DRUCE, H. H. 1907. Descriptions of some new Butterflies from Tropical Africa. *Trans. ent. Soc. Lond.* **1907** : 77–82.

—— 1910. Descriptions of new Lycaenidae and Hesperiidae from tropical West Africa. *Proc. zool. Soc. Lond.* **1910** : 356–378.

DUFRANE, A. 1945. Lépidoptères du Kivu. *Bull. Annls Soc. ent. Belg.* **81** : 90–143.

GROSE-SMITH, H. 1898. Descriptions of new species of African butterflies in the Tring Museum. *Novit. zool.* **5** : 350–358.

GROSE-SMITH, H. & KIRBY, W. F. 1887–1902. *Rhopalocera Exotica.* London. 3 vols.

HEWITSON, W. C. 1862–1878. *Illustrations of diurnal Lepidoptera. Lycaenidae.* London.

HOLLAND, W. J. 1920. Lepidoptera of the Congo. *Bull. Am. Mus. nat. Hist.* **43** (6) : 109–368, figs.

HULSTAERT, G. 1924. *Lycaenidae* nouveaux des collections du Musée du Congo Belge. *Revue zool. afr.* **12** : 112–122, 173–194.

JOICEY, J. J. & TALBOT, G. 1921. New Lepidoptera collected by T. A. Barns in east central Africa. 2. New forms of Rhopalocera. *Bull. Hill Mus. Witley* **1** : 44–118, figs.

KIRBY, W. F. 1887. Descriptions of new species of *Papilionidae, Pieridae* and *Lycaenidae*. *Ann. Mag. nat. Hist.* (5) **19** : 360–368.

LATHY, P. I. 1903. An account of a collection of Rhopalocera made on the Anambara Creek in Nigeria. *Trans. ent. Soc. Lond.* **1903** : 183–206, figs.

NEAVE, S. A. 1804. On a large collection of Rhopalocera from the shores of the Victoria Nyanza. *Novit. zool.* **11** : 323–360.

PETERS, W. 1952. *A provisional check list of the Butterflies of the Ethiopian Region.* London.

PLÖTZ, C. 1880. Verzeichniss der von Prof. E. Buchholz in West Afrika gesammelten Schmetterlinge. *Stettin. ent. Ztg* **41** : 189–206, 477–478.

REBEL, H. 1914. Wissenschaftliche Ergebnisse der Expedition R. Grauer nach Zentralafrika. *Annln naturh. Mus. Wien* **28** : 219–294, figs.

SCHULTZE, A. 1916. Weitere neue Rhopaloceren aus der Ausbeute der II. Inner-Afrika Expedition. *Arch. Naturgesch.* **82A** (3) : 34–39.

SCHULTZE, A. & AURIVILLIUS, C. 1923. *Ergebnisse der Zweiten Deutschen Zentral-Afrika-Expedition* 1910–1911. Lepidoptera III. **1** (17) : 1113–1194, figs.

STEMPFFER, H. 1961. Contribution à l'étude des Lépidoptères Lycaenidae de l'Afrique équatoriale. *Annls Mus. r. Afr. centr.* (8) Sci. Zool. **94** : 73 pp., figs.

—— 1965. Contribution à la faune du Congo (Brazzaville). Mission A. Villiers et A. Descarpentries. *Bull. Inst. Fr. Afr. noire* **27**, sér. A (4) : 1449–1465.

SUFFERT, E. 1904. Neue afrikanische Tagfalter. *D. ent. Z. Iris* **17** : 12–107, figs.

TALBOT, G. 1935. New species and forms of African *Lycaenidae*. *Entomologist's mon. Mag.* **71** : 69–78, 115–127, 147–153, 3 pls, 3 figs.

—— 1937. New African *Lycaenidae* & *Nymphalidae* and two new *Diestogyna* (Lepidoptera). *Trans. R. ent. Soc. Lond.* **86** : 59–72, pls. 1, 2.

WILSON, C. E. 1953. Butterflies of the Southern Sudan. *Sudan Notes Rec.* **34** : 73–103, pl. 15.

## INDEX

Acraea, 20
acraea, 4, 5, 14, 17
acraeoides, 10, 14, 15
actinotina, 20
albofasciata, 4, 6, 12, 13
angustifascia, 8
anneckii, 16
atrimacula, 7, 8
atrinervis, 11
aurivillii, 9

Balacra, 3
bimacula, 4, 5, 6
bimaculata, 12
bistrigata, 16

cameroonensis, 11
carnuta, 20
conjuncta, 5
consanguinea, 18, 19

depuncta, 16
Durbania, 20

echo, 4
erica, 17, 18
exstincta, 18
exsuperia, 13

fervida, 5

hollandi, 13

ja, 11
jefferyi, 9

kamitugensis, 20
katangae, 19
kayonza, 10, 14
kelle, 10, 13

laplumei, 20
Liptena, 4, 5, 6, 7, 14, 16, 20
lotti, 12

mariae, 16
medjensis, 16

neavei, 8
nigra, 17, 18
nigrita, 4, 5
nyanza, 7, 17

parva, 20
Pentila, 4, 5, 16, 20, 21
plagiata, 15
Ptelina, 20

rogersi, 21
rothi, 3, 7, 9, 20
rothioides, 9
rufilla, 7
ruspinoides, 19

sanguinea, 7, 14, 16
semirufa, 4, 6, 7
sheffieldi, 9
subhyalina, 20
sulpitia, 10

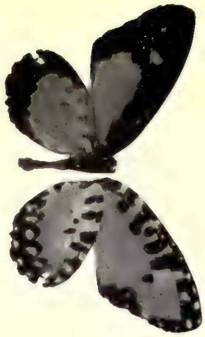
transverstigma, 12

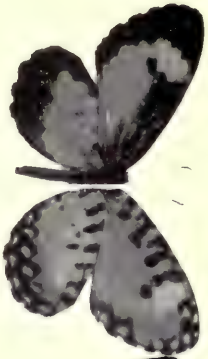
ugandae, 19

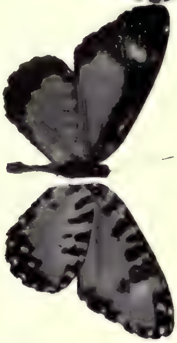
venanigra, 11
villiersi, 10

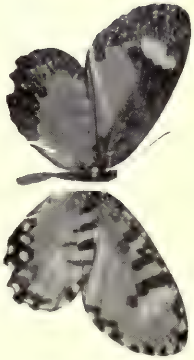
## PLATE 1

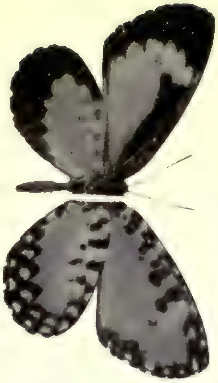
FIGS. 1, ♂ and 5, ♀, upper and undersides of *Telipna acraea* (Doubleday, Westwood & Hewitson). Figs. 6, Holotype ♂ and 2, Allotype ♀, upper and undersides of *T. acraea conjuncta* ssp. n. Figs. 3, ♂ and 7, ♀, upper and undersides of *T. acraea bimacula* (Plötz). Figs. 8, Allotype ♂ and 4, Holotype ♀, upper and undersides of *T. acraea nigrita* ssp. n. Figs. 9, Holotype ♂ and 13, Allotype ♀, uppersides only of *T. albofasciata* Aurivillius. Figs. 14, ♂ and 10, ♀, upper and undersides of *T. semirufa* (Grose-Smith & Kirby). Figs. 11 and 15, Holotype ♂, upper and underside of *T. rufilla* (Grose-Smith & Kirby). Figs. 12, ♂ and 16, ♀, upper and undersides of *T. rothi* (Grose-Smith).

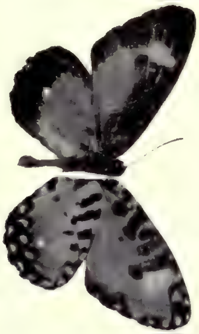

1

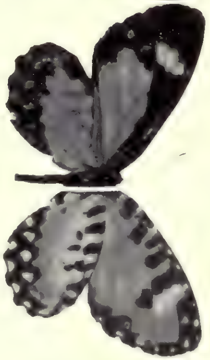

2

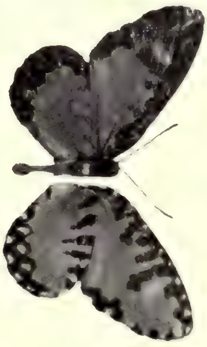

3

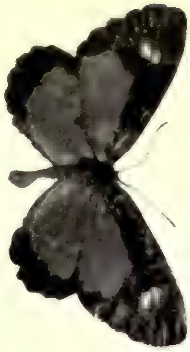

4

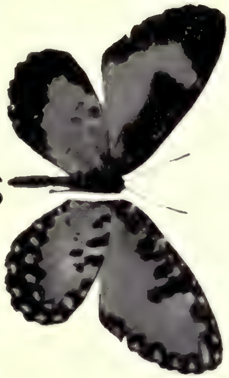

5

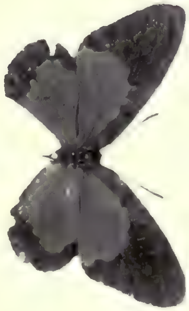

6

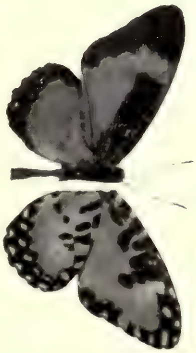

7

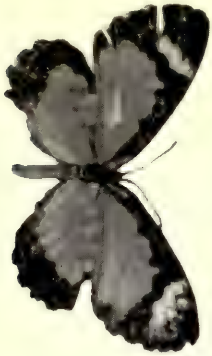

8

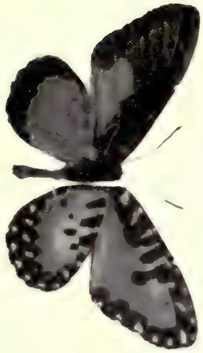

9

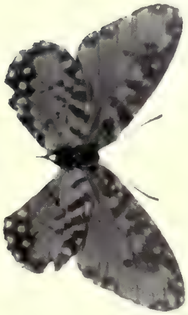

10

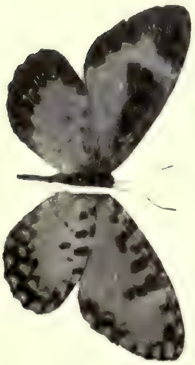

11


12


13

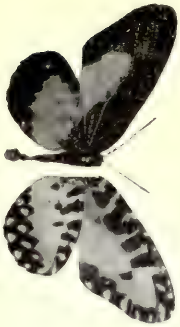

14

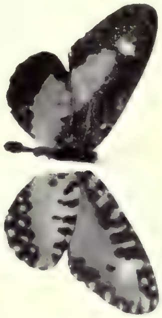

15

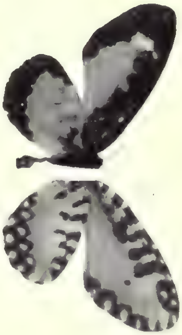

16

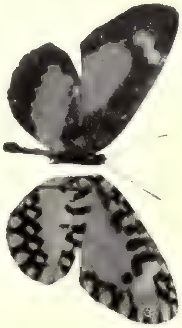
## PLATE 2

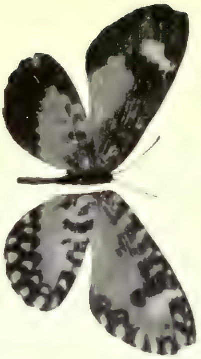
FIGS. 17. Holotype ♂ and 21, ♀, upper and undersides of *Telipna citrimacula* Schultze. Figs. 18, ♂ and 22, ♀, upper and undersides of *T. citrimacula angustifascia* Joicey & Talbot. Figs. 19, ♂ and 23, ♀, upper and undersides of *T. citrimacula neavei* Baker. Figs. 20, ♂ and 24, ♀, upper and undersides of *T. sheffieldi* Baker. Figs. 29, Holotype ♂ and 24, Allotype ♀, upper and undersides of *T. aurivillii* Rebel. Figs. 26, Holotype ♂ and 30, Allotype ♀, upper and undersides of *T. aurivillii jefferyi* ssp. n. Figs. 31, Neallotype ♂ and 27, ♀, upper and undersides of *T. sulpitia* Hulstaert. Figs. 28, ♂ and 32, Neallotype ♀ upper and undersides of *T. villiersi* Stempffer.

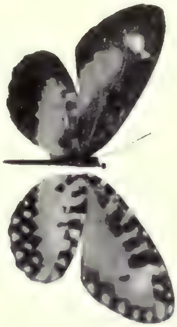

17

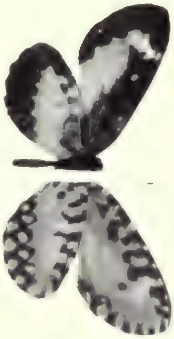

18

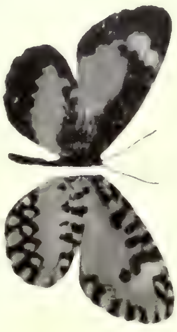

19

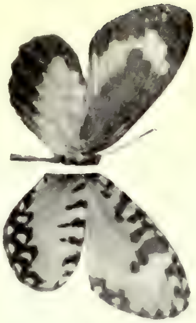

20

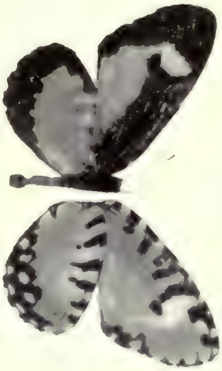

21

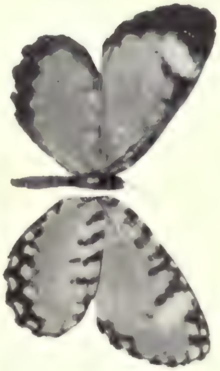

22

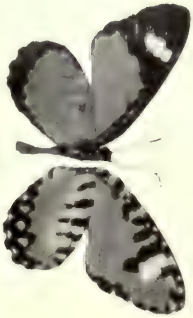

23

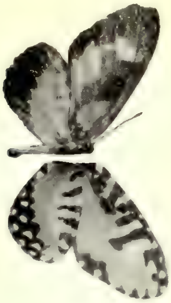

24

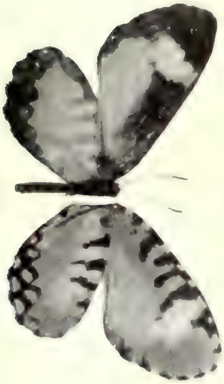

25

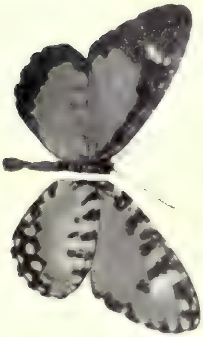

26

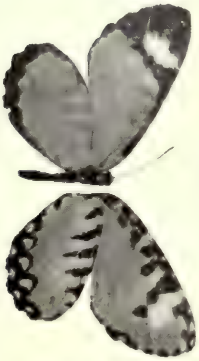

27


28


29

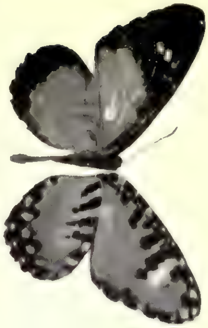

30

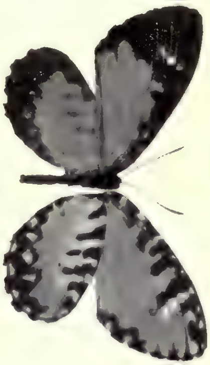

31

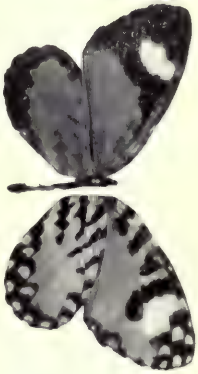

32

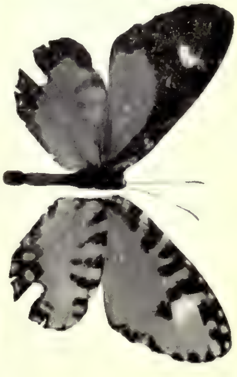
## PLATE 3

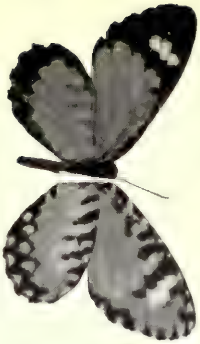
Figs. 33, Holotype ♂ and 37, Allotype ♀, upper and undersides of *Telipna cameroonensis* sp. n. Figs. 38, ♂, and 34, ♀, upper and undersides of *T. atrinervis* Hulstaert. Figs. 39, Neallotype ♂ and 35, Holotype ♀, upper and undersides of *T. transversistigma* Druce. Figs. 36, Holotype ♂ and 40, Allotype ♀, upper and undersides of *T. lotti* sp. n. Figs. 41, Holotype ♂ and 44, Allotype ♀, upper and undersides of *T. hollandi* Joicey and Talbot. Figs. 42, Holotype ♂ and 45, Allotype ♀, upper and undersides of *T. kelle* sp. n. Figs. 43, Holotype ♂ and 46, Allotype ♀, upper and undersides of *T. acraeoides* Grose-Smith and Kirby.

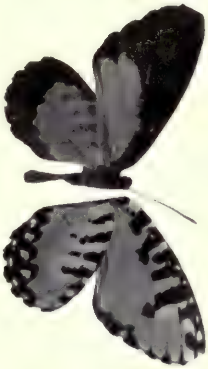

33

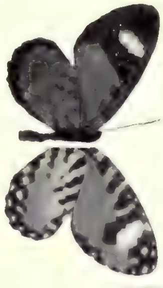

34

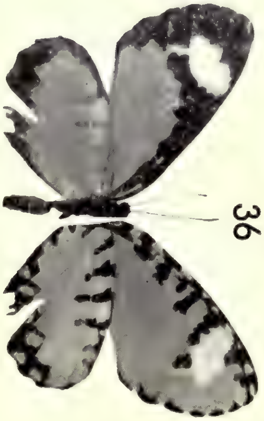

35

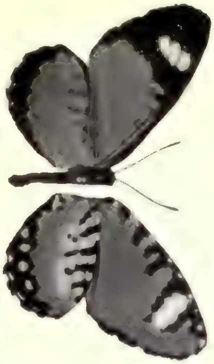

36

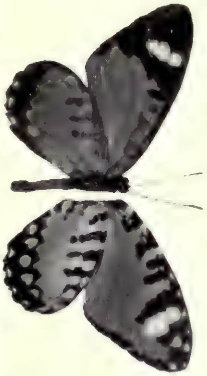

37

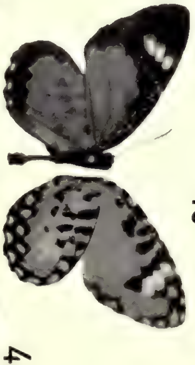

38

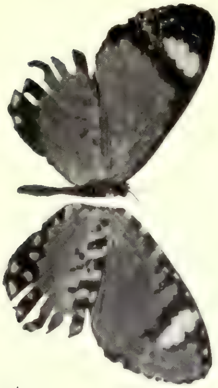

39

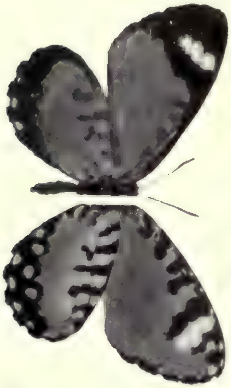

40

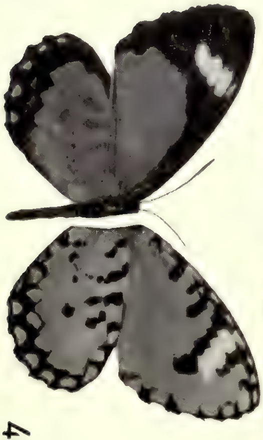

41


42


43


44

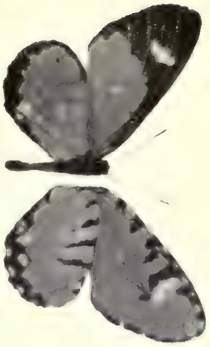

45


46

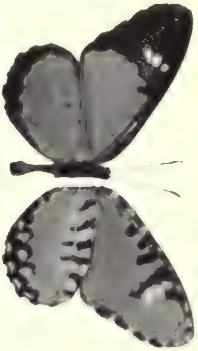
## PLATE 4

FIGS. 47, Holotype ♂ and 50, Allotype ♀, upper and undersides of *Telipna kayonza* sp. n. Figs. 48, Neallotype ♂ and 51, Holotype ♀, upper and undersides of *T. plagiata* Joicey & Talbot. Figs. 49, ♂ and 52, ♀, upper and undersides of *T. sanguinea* Plötz. Figs. 53, ♂, and 56, ♀, upper and undersides of *T. sanguinea depuncta* Talbot. Figs. 54, ♂ and 57, ♀, upper and undersides of *T. nyanza* Neave. Figs. 55, Neallotype ♂ and 58, Holotype ♀, upper and undersides of *T. erica* Suffert.

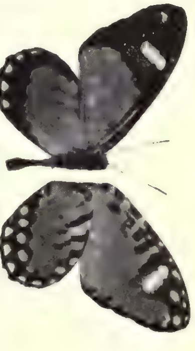
47



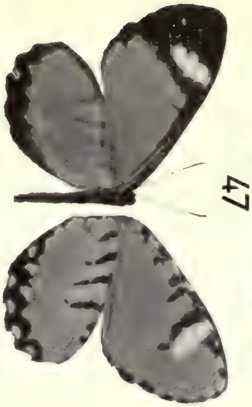
48



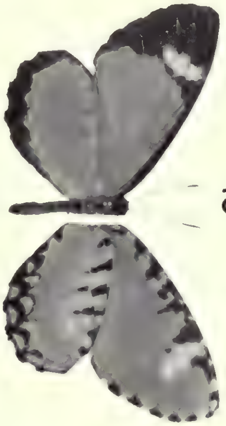
49



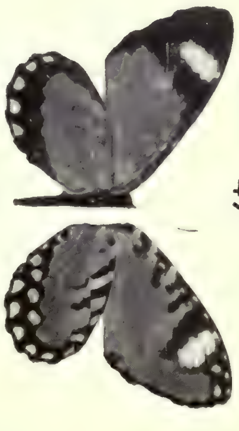
50



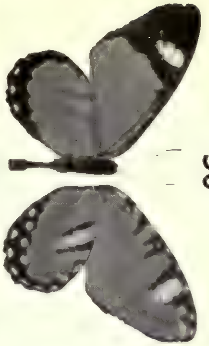
51



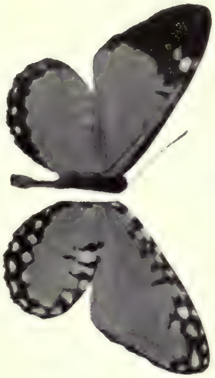
52



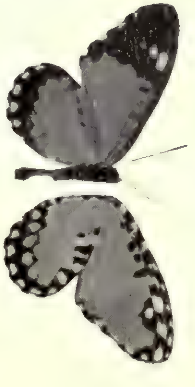
53



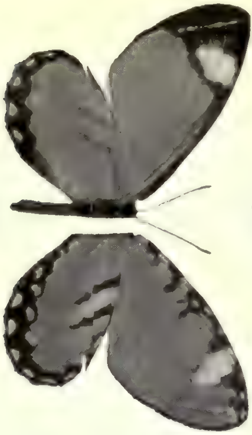
54



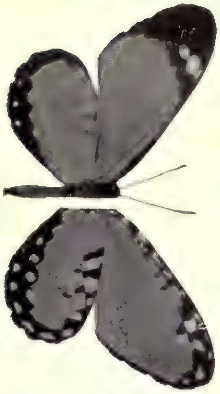
55



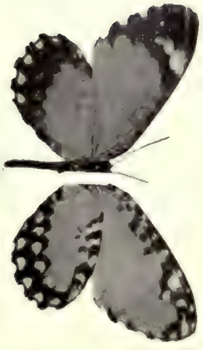
56



57



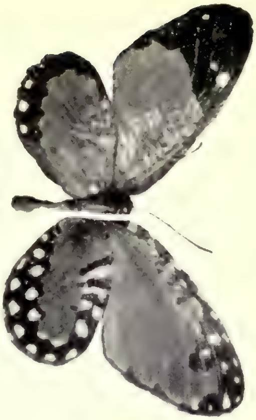
58

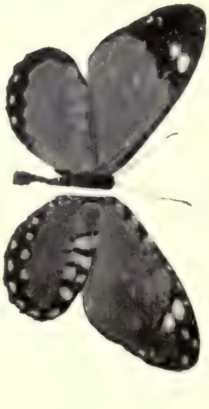


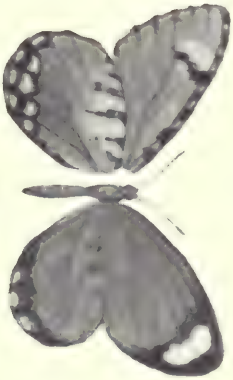
## PLATE 5

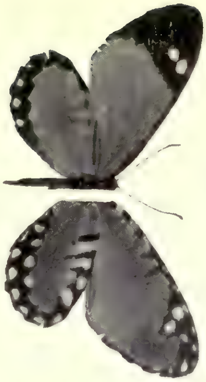
Figs. 59, Holotype ♂ and 62, ♀, upper and undersides of *Telipna consanguinea* Rebel. Fig. 61, Holotype ♀, as figured by Holland (see text) of *T. medjensis* Holland. Figs. 60, ♂ and 63. ♀, upper and undersides of *T. consanguinea ugandae* Baker. Figs. 64, Paratype ♂ and 66, Paratype ♀, upper and undersides of *T. katangae* Stempffer. Figs. 65, Neotype ♂ and 67, Neallotype ♀, upper and undersides of *T. ruspinoides* Schultze.

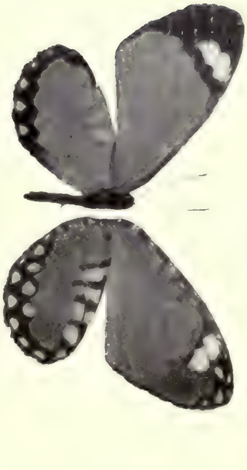
BRITISH MUSEUM
24 JAN 1969
NATUR

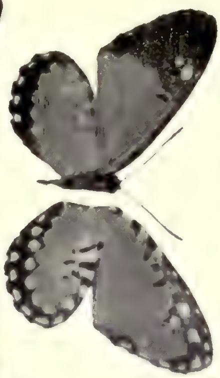

59

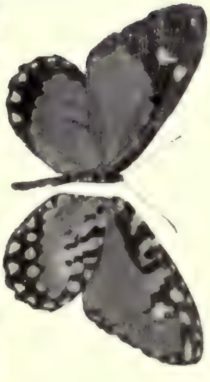

60

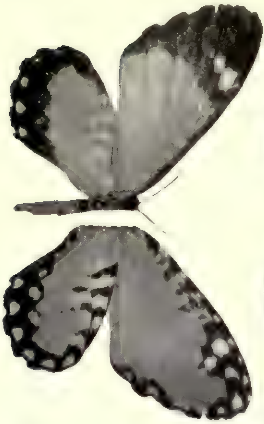

61

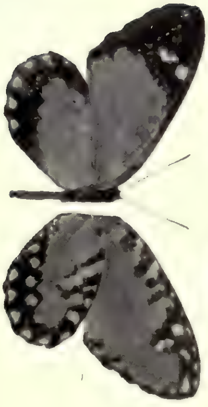

62


63


64


65


66


67

# A LIST OF SUPPLEMENTS TO THE ENTOMOLOGICAL SERIES OF THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

---

1. MASNER, L. The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Pp. 143. February, 1965. £5.
2. NIXON, G. E. J. A reclassification of the tribe Microgasterini (Hymenoptera : Braconidae). Pp. 284 ; 348 Text-figures. August, 1965. £6.
3. WATSON, A. A revision of the Ethiopian Drepanidae (Lepidoptera). Pp. 177 ; 18 plates, 270 Text-figures. August, 1965. £4 4*s*.
4. SANDS, W. A. A revision of the Termite Subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. Pp. 172 ; 500 Text-figures. October, 1965. £3 5*s*.
5. AHMAD, I. The Leptocorisinae (Heteroptera : Alydidae) of the World. Pp. 156 ; 475 Text-figures. November, 1965. £2 15*s*.
6. OKADA, T. Diptera from Nepal. Cryptochaetidae, Diastatidae & Drosophilidae. Pp. 129 ; 328 Text-figures. £3.
7. GILIOMEE, J. H. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera : Coccoidea). Pp. 168 ; 43 Text-figures. February, 1967. £3 3*s*.
8. FLETCHER, D. S. A revision of the Ethiopian species and a check list of the world species of *Cleora* (Lepidoptera : Geometridae). Pp. 119; 14 plates, 146 Text-figures, 9 maps. February, 1967. £3 10*s*.
9. HEMMING, A. F. The Generic Names of the Butterflies and their type-species (Lepidoptera : Rhopalocera). Pp. 509. August, 1967. £8 10*s*.
10. STEMPFFER, H. The Genera of the African Lycaenidae (Lepidoptera : Rhopalocera). Pp. 322 ; Coloured frontispiece, 348 text-figures. August, 1967. £8.
11. MOUND, L. A. A review of R. S. Bagnall's Thysanoptera Collection's Pp. 184; 82 Text-figures. May, 1968. £4.
12. WATSON, A. The Taxonomy of the Drepaninae represented in China, with an Account of their World Distribution (Lepidoptera : Drepanidae). Pp. 151: 293 Text-figures, 14 plates. November, 1968. £5.

PRINTED IN GREAT BRITAIN BY ADLARD & SON LIMITED, BARTHOLOMEW PRESS, DORKING.

24 JAN

# ACRIDOIDEA OF THE GALAPAGOS ISLANDS (ORTHOPTERA)

V. M. DIRSH

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 2
LONDON : 1969

BRITISH MUSEUM
24 JAN 1969
NATURAL HISTORY

# ACRIDOIDEA OF THE GALAPAGOS ISLANDS (ORTHOPTERA)

BY

V. M. DIRSH

Anti-Locust Research Centre, London

*Pp.* 25–51; 7 *Plates,* 79 *Text-figures*

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 2
LONDON: 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In* 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Vol.* 23, *No.* 2 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

*World List* abbreviation :
*Bull. Br. Mus. nat. Hist.* (Ent.).

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued* 28 *January*, 1969 *Price* £1 1s

# ACRIDOIDEA OF THE GALAPAGOS ISLANDS (ORTHOPTERA)

*By* V. M. DIRSH

## SYNOPSIS

The Acridoidea of Galapagos Islands are revised. The valid species are redescribed and lectotypes are selected. The systematic position of the species is reviewed.

## CONTENTS

| | Page |
|---|---|
| INTRODUCTION | 27 |
| ACKNOWLEDGEMENTS | 27 |
| NAMES OF THE ISLANDS | 28 |
| ZOOGEOGRAPHICAL REMARKS | 28 |
| TAXONOMY | 30 |
| REFERENCES | 50 |

## INTRODUCTION

SINCE Darwin's travels the Galapagos Islands have deservedly become famous as a sanctuary for numerous endemic species of various classes of the animal kingdom. Of them all, insects have been the least studied. However, lately this gap has begun to be filled (Linsley and Usinger, 1966).

This paper is an attempt to review the Acridoidea fauna of these islands on the basis of much material which was not available to earlier authors. The views of earlier authors are reviewed in the light of the latest taxonomic studies, which have sometimes demanded redescriptions of the types and revaluation of the taxonomic status of some of the species and subspecies. All the genera and species known from these islands are mentioned; they comprise 4 genera and 9 species.

## ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to the following colleagues who have helped me by providing the types and material for this work: Dr. Ch. L. Hogue, Los Angeles County Museum of Natural History; Dr. P. H. Arnaud, Jr., California Academy of Sciences; Mr. D. C. Rentz, University of California, Berkeley; Dr. A. B. Gurney, U. S. National Museum, Washington; Dr. H. E. Evans, Museum of Comparative Zoology, Harvard University; Dr. P. J. Persson, Naturhistoriska Rijksmuseum, Stockholm; Dr. H. Radclyffe-Roberts, The Academy of Natural Sciences of Philadelphia; Dr. H. Schräder, Naturmuseum und Forschung-Institut, Senckenberg; Dr. F. Kühlorn, Zoologische Sammlung des Bayerischen Staates; Mr. J. P. Doncaster, Keeper of the Department of Entomology of the British Museum (Natural History); and Dr. D. R. Ragge of the same Department. Finally, I would like to thank Dr. T. H. C. Taylor for reading and editing the manuscript.

## NAMES OF THE ISLANDS

Because most of the islands of the Galapagos Archipelago have more than one name (English and Spanish) and sometimes two different islands (Gardner Is.) have the same name, a list showing the names and synonyms is given below. In this paper the English names are used.

| *English names* | *Spanish names* |
|---|---|
| Abingdon | Pinta, Geraldino |
| Albermarle | Isabela, Santa Gertrudis |
| Barrington | Santa Fé |
| Bartholomew | Bartholomé |
| Bindloe | Marchena, Torres |
| Champion | —— |
| Charles | Santa Maria, Floreana |
| Chatham, Dassigney | San Cristóbal, Grande |
| Culpepper | Darwin, Guerra |
| Daphne Major | —— |
| Daphne Minor | —— |
| Duncan, Dean | Pinzón |
| Eden | —— |
| Gardner-near-Charles | —— |
| Gardner-near-Hood | —— |
| Hood | Española |
| Indefatigable, Norfolk, Porter | Santa Cruz, Bolivia, Chavez,<br>San Clemente, Valdez |
| James, York | San Salvador, Santiago, Gil, Olmedo |
| Jervis | Rábida |
| Narborough | Fernandina, Plata |
| North Seymour | Seymour |
| —— | Plaza |
| South Seymour | Baltra |
| Tower, Ewres | Genovesa |
| Wenman | Wolf, Gasna, Nunez |

## ZOOGEOGRAPHICAL REMARKS

The finches observed by Darwin on the Galapagos Islands attracted the attention of the whole scientific world. Their specialization was attributed to the insular isolation. Van Denburgh (1914) and many other authors noticed that land tortoises and iguanas from different islands, although of the same species, could be distinguished and their origin in each case from a particular island or even part of an island could be determined. The differences within species are probably due not only to physical isolation but also the ' territorial instinct ' of these animals. They are attached to their breeding places and there is evidence (Eibl-Eibesfeldt, 1960) that every individual claims its own bit of territory and even fights for it, protecting its rights. This same territorial instinct has been observed also in crabs. In Acridoidea, species of the genus *Schistocerca* are good fliers and can easily cover the distances between the islands, and the territorial instinct has never been observed in Acridoidea.

Snodgrass (1902) erected several subspecies of *Schistocerca melanocera* (Stål, 1861), and Scudder (1893) several subspecies of *Schistocerca literosa* (Walker, 1870), but both authors based their subspecies on insufficient material and considered the range of variability of the species as racial; when more material from various island was available it became clear that the ' subspecies ' fit into the range of variability of the species from a single island. Hebard (1920) and the present author synonymized these subspecies and one species.

A different picture arose when the genus *Halmenus* was studied. The species of this genus are brachypterous or micropterous and cannot fly. All of them are morphologically very similar, but the populations from different islands can be distinguished. It is clear that the various forms of *Halmenus* could appear only as a result of physical isolation, and since the males' internal genital organs are very similar, the isolation has probably not been of long duration.

In the case of the genus *Sphingonotus* the position is rather similar to *Schistocerca*. All the species are macropterous and can fly. However, the species of *Sphingonotus* are small and according to observation they are not long-distance fliers but can be carried by the wind. In the Galapagos Islands much more variability can be observed in *Sphingonotus* than in *Schistocerca*, and possibly there is already a tendency to form races on the different islands.

Concerning the genera *Closteridia* (*C. bauri* Scudder, 1893) and *Desmopleura* (*D. concinna* Scudder, 1893), the former is known by the type only and the latter by only a few specimens.

How did Acridoidea populate the Galapagos Archipelago? The islands may have been nearer to the continent, or they may even have been connected with it and have separated by Continental Drift (Cox, 1966). However, in a later paper it was suggested that they are of rather recent origin. Cox and Dalrymple (1966), on the basis of palaeomagnetism and Potassium-Argon measurements, determined that the rocks exposed above sea level were extruded during the Brunhas Matuyama polarity epochs and this process took place only about 2·4 million years ago. In any case the islands could be populated from the continent only, the shortest distance of which now is about 500 miles. Some species, such as *Schistocerca melanocera* and *literosa*, could easily fly such distances, particularly if winds were favourable. The small, winged species of *Sphingonotus* could travel the same way. Wingless and short-winged species could be carried to the Archipelago by the oceanic currents, with debris.

Orr (1966) observed that vegetation debris was carried by the rivers of South America down to the coast and into the sea, where they formed raft-like masses up to 10 ft. in diameter. There they were caught by the South Equatorial Current and Humboldt Current and, according to Orr's calculation, could theoretically reach the Galapagos Islands in less than two weeks.

If we accept the estimate of Cox and Dalrymple (1966) concerning the time of origin of the Galapagos Islands, then the evolutionary changes in the Galapagos

Acridoidea took a remarkably short time. There is on the continent no species of *Schistocerca* very closely related to the Galapagos species. The same applies to the three genera *Desmopleura*, *Closteridia* and *Halmenus* and partly to *Sphingonotus*. The species of the latter have a very near relative on the Puna Islands, which are only about two miles from the Ecuador shore.

## *SCHISTOCERCA* Stål, 1873

*Acridium* (*Schistocerca*) Stål, 1873.
*Schistocerca* Stål, 1876.

The genus *Schistocerca* belongs to the subfamily Cyrtacanthacridinae of Acrididae. It contains numerous species on the American continent and one in the Old World (Africa and South-west Asia), but occasional specimens sometimes fly, aided by air currents, far from the usual area of distribution.

In the Galapagos Archipelago, according to the studies presented in this paper, there are only two species of this genus. How they populated these islands we can only guess. It could have been by free flight or by being carried by the wind or oceanic currents. They certainly came from the American continent, and probably from the northern part of South America. Apparently there are in America no species closely related to the two Galapagos species. However, it must be noted that the genus *Schistocerca* is probably of comparatively recent origin and is expanding, forming numerous forms and variations. An indication of this possibility is that the internal genitalia are very similar in all the species of the genus, in America, the Old World and the Galapagos Islands. The variability within the species, particularly the American ones, is very great. The external morphological characters are as similar between species as the phallic complex and in many cases only morphometric characters, pattern and coloration serve to distinguish the species.

There are not in America or in the Old World any genera which can be considered to be closely related to *Schistocerca*; the main characters—the flattened plate-like cerci in combination with the excised distal end of the subgenital plate in males—do not occur in such a combination in other genera of the subfamily.

However, in the genus *Halmenus*, which occurs only in the Galapagos Islands, there is a small excision on the male subgenital plate, though smaller than in *Schistocerca*, and the cerci are flattened as well, but of angular shape, unlike those of *Schistocerca*. The internal genitalia are so similar to those of *Schistocerca* that they can be easily confused, and the spermatheca is also extremely similar. The mesosternal lobes of *Halmenus* are not fully typical of Cyrtacanthacridinae, but are not sufficiently atypical to exclude the genus from this subfamily.

There is thus much scope for speculation concerning the origin of *Schistocerca* and its relationship with other genera, but the author feels that the time is not at present ripe for it. The American genera *Abracris* and *Osmilia* (both long-winged) occupy the same indefinite position as *Halmenus* and they too should perhaps be placed into Cyrtacanthacridinae. This would complicate the question of the relationship of *Schistocerca* even more, particularly because hitherto it has been regarded as the only representative of the subfamily Cyrtacanthacridinae in the whole of America.

It is obvious that further study of the South and Central American fauna is urgently needed before definite conclusions can be reached.

The distribution of the two species of the genus on the Galapagos Islands is rather peculiar. On the information at present available it can be stated (but not yet explained because of lack of information) that *S. melanocera* inhabits almost all the islands of the Archipelago, while *S. literosa* occurs only on islands on the south-eastern fringe of it (see map).

## ***Schistocerca melanocera*** (Stål, 1860)

(Pl. 1, Text-figs. 1–12, Map 1)

*Acridium melanocerum* Stål, 1860 : 326. Type ♀. 'Insulae Galapagos'. Naturhistoriska Rikmuseet, Stockholm.

*Acridium tibiale* Walker, 1870 : 582 (Kirby, 1910 : 457). Type ♂. 'West coast of America'. British Museum (Natural History), London.

*Acridium (Schistocerca) melanocerum* Stål, 1860 : 326 (Stål, 1873 : 65).

*Schistocerca melanocera* (Stål, 1860) (Bruner, 1889 : 193).

*Schistocerca melanocera minor* Snodgrass, 1902 : 421 (Hebard, 1920 : 323). LECTOTYPE ♀. 'Tagus Cove, Albemarle'. By present selection from 6 ♂ and 6 ♀ syntypes. Los Angeles County Museum of Natural History, U.S.A.

*Schistocerca melanocera pallida* Snodgrass, 1902 : 422 (Hebard, 1920 : 323). LECTOTYPE ♀. 'Barrington Is.' By present selection from 5 ♂ and 2 ♀ syntypes. Los Angeles County Museum of Natural History, U.S.A.

*Schistocerca melanocera lineata* Snodgrass, 1902 : 423 (Hebard, 1920 : 323). LECTOTYPE ♀. 'Albemarle Is. Iguana Cove.' By present selection from 7 ♂ and 8 ♀ syntypes. Los Angeles County Museum of Natural History, U.S.A.

*Schistocerca melanocera immaculata* Snodgrass, 1902 : 423 (Hebard, 1920 : 323). LECTOTYPE ♂. 'Indefatigable Is.' By present selection from 3 ♂ and 3 ♀ syntypes. Los Angeles County Museum of Natural History, U.S.A.

*Schistocerca intermedia* Snodgrass, 1902 : 431. **Syn. n.** Type ♀ (lost). 'Duncan Island.' *Neotype* ♀. 'Pinzon Island.' = Duncan Is. California Academy of Sciences, U.S.A.

*Schistocerca intermedia borealis* Snodgrass, 1902 : 435. **Syn. n.** LECTOTYPE ♂ by present selection from 2 ♂ and 1 ♀ syntypes, Bindloe Is. Los Angeles County Museum of Natural History, U.S.A.

All subspecies of *Schistocerca melanocera* were rightly synonymized by Hebard, 1920. They cannot be separated either by morphological, colour or morphometric characters. Using a few specimens from the different islands, the difference, even if it is very small, can sometimes be detected, but as soon as a series is available the material becomes a continuous series, which cannot be separated according to the islands' sources. For example, the subspecies *melanocera melanocera* (*sensu* Snodgrass) from Charles Island possesses a yellowish spot on the lateral lobe of the pronotum. On the basis of this spot, Snodgrass (1902) considered it to be a subspecies. On Charles Island most specimens possess this spot, but some do not. On the other hand some specimens from Barrington, Albemarle, North and South Seymour, James, Narborough, Jervis, Darwin and some other islands also possess it. This invalidates the character as a subspecific one.

It is well known that coloration and partly pattern depend very much not only on the genotypical basis of the population but also on the colour of the environment in which the specimens grow and live.

The same considerations are applicable to the other characters used by Snodgrass for differentiation of the subspecies. They are even weaker in this respect than the yellowish spot on the pronotum.

The newly synonymized *Sch. intermedia* belongs to the same category. The type of it is lost, but the topotypical material from Duncan Is., which agrees with Snodgrass' description, differs from the typical *melanocera* only in the paler greyish general coloration and in the more pronounced spots on the tegmina. No morphological or morphometric differences were found. This coloration is probably the result of the specimens having developed on a lighter-coloured background. To attribute to them specific or even subspecific value is not possible for the above reasons and also because some of the specimens from Barrington, Chatham and Jervis Islands are practically identical with the *intermedia* from Duncan Island.

The subspecies *Sch. intermedia borealis* is characterized only by the more developed pattern of the tegmina; in all other respects it is the same as *melanocera* and *intermedia*.

The opinion was expressed (Hebard, 1920) that *Sch. intermedia intermedia* is an intermediate form between *Sch. melanocera* and *literosa*. But a morphometric study showed that they can be differentiated, the hind femur being relatively longer and narrower in *melanocera* than in *literosa*.

The variability in the size of the body of *Sch. melanocera* is rather great, but it cannot be associated with any particular island.

Redescription. ♂. Large. Integument slightly rugose and pitted. Antenna longer than head and pronotum together. Fastigium of vertex short, obtuse-angular, with shallow oval depression in middle; frontal ridge low, with margins parallel and slight depression at ocellus. Dorsum of pronotum subcylindrical, slightly widening backwards and slightly constricted in anterior half; median carina low, linear, crossed by three deep sulci; metazona slightly longer than prozona, its posterior margin obtuse-angular to almost rounded; lateral lobes in prozona concave. Prosternal process from narrow cylindrical to subconical, at apex rounded. Mesosternal interspace about twice as long as its width in middle, slightly widening in front. Tegmina and wings far exceeding end of abdomen. Opening of tympanal organ almost semicircular, membrane deeply set forming wide angle with body wall. Hind femur comparatively long and narrow, average ratio of length to maximum width 4·87. Hind tibia as long as femur. Supra-anal plate elongate-angular, in middle of basal part with longitudinal sulcus merging with lateral carinulae, sides upcurved, forming ridge-like elevations. Cercus slightly narrowing towards apical part; upper half of apex angularly protruding. Subgenital plate in profile short, narrow, at apex attenuate.

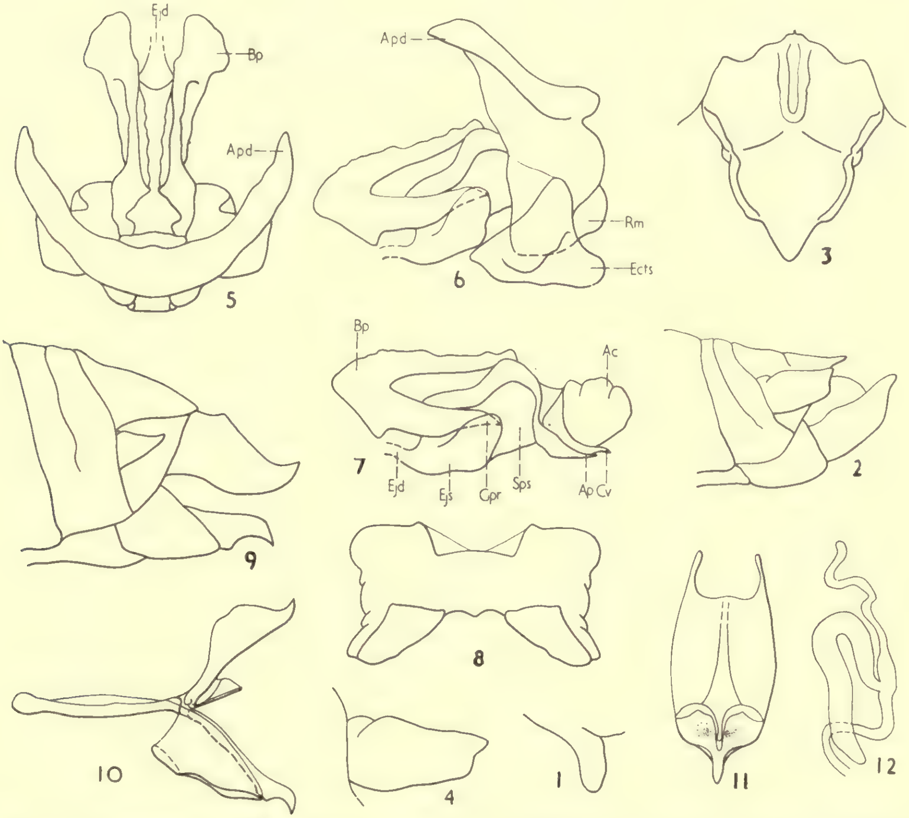
Phallic complex: of usual structure for the genus; apical valves of penis shorter than valves of cingulum.

Coloration: in general, from shiny dark brown to dull brownish grey. Antenna blackish; face as general coloration, with longitudinal yellowish or ochraceous stripes on sides of frontal ridge and on genae; prozona of pronotum blackish or brown; metazona from yellowish to dull ochraceous; in upper part of lateral lobe of prozona sometimes a small yellowish spot; head above, with yellowish narrow stripe, which merges with yellowish median carina; tegmen uniformly shiny blackish or brown, sometimes with a few dark brown spots in medial area, sometimes dull brownish or greyish with spots more developed and scattered over whole tegmen; membrane in dark specimens less transparent than in greyish ones; wing blackish or infumate; outer side of hind femur blackish with yellowish longitudinal stripe in lower part of medial area, upperside with two indefinite, brown, transverse fasciae, in greyish specimens the blackish upper part of medial area greyish and sometimes tending to disappear; hind tibia yellow.

♀. Larger than male. Ovipositor, in profile, comparatively short and wide; upper valve about half as wide as long. In other respects as male.

## *Measurements*

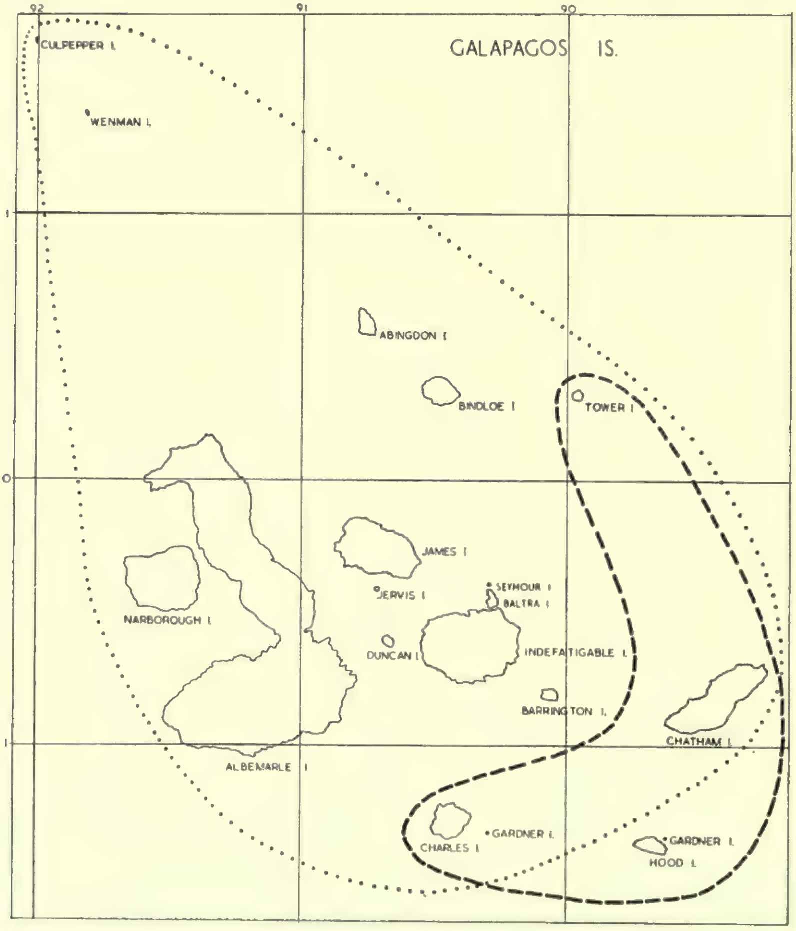
| | | Length of body | Length of pronotum | Length of tegmen | Length of hind femur | Ratio of length to width, of hind femur |
|---|---|---|---|---|---|---|
| ♂ | Range | 30·7–49·1 | 6·2–8·2 | 32·1–49·0 | 17·4–25·5 | 4·4–5·4 |
| | Average | 40·2 | 7·7 | 41·7 | 21·1 | 4·87 |
| ♀ | Range | 41·4–64·5 | 7·7–12·3 | 44·9–65·5 | 21·5–32·3 | 4·5–5·9 |
| | Average | 54·3 | 10·4 | 55·5 | 27·8 | 5·02 |



FIGS. 1–12. *Schistocerca melanocera.* 1–8, ♂: 1, prosternal process; 2, end of abdomen, side view; 3, supra-anal plate; 4, left cercus; 5, phallic complex from above (epiphallus and most of ectophallic membrane removed); 6, the same, lateral view; 7, endophallus, lateral view; 8, epiphallus (bridge in horizontal position). 9–12, ♀: 9, end of abdomen lateral view; 10 sclerotized parts of ovipositor; 11, subgenital plate, inner view; 12, spermatheca.

Geographical distribution: Abingdon, Albemarle, South Seymour, Barrington, Charles, Chatham, Culpepper, Duncan, Gardner (near Charles), Indefatigable, James, Jervis, Narborough, Tower.

The main differences between *Sch. melanocera* and *Sch. literosa* are in size and coloration. Their phallic complexes are rather similar. Measurements overlap, but there is one morphometric character by which it is possible to separate these two species: the hind femur is relatively more slender and narrower in *Sch. melanocera* than in *Sch. literosa*. This difference can be detected visually, and statistically it is as follows: Ratio of length to maximum width of hind femur in *melanocera* is in males: mean 4·87, standard deviation ± 0·23, standard error ± 0·02; and in females: mean 5·02, standard deviation ± 0·21, standard error ± 0·02. The corresponding ratio in *literosa* is in males mean 4·47, standard deviation ± 0·23, standard error ± 0·04; and in females: mean 4·55, standard deviation ± 0·20, standard error ± 0·04.


92
91
90
GALAPAGOS IS.
CULPEPPER I.
WENMAN I.
1
ABINGDON I.
BINDLOE I
TOWER I
0
JAMES I
SEYMOUR I
BALTRA I
JERVIS I
NARBOROUGH I.
DUNCAN I
INDEFATIGABLE I.
BARRINGTON I.
CHATHAM I.
1
ALBEMARLE I
GARDNER I.
CHARLES I
GARDNER I.
HOOD I.

MAP I. Area of distribution of *S. melanocera* (dotted line) and *S. litorosa* (interrupted line).

The difference of means between these two species is: in males 0·41, standard error ± 0·04, *t* 9·37, *df* 264, $P < 0{\cdot}001$; and in females 0·48, standard error ± 0·04, *t* 10·97, *df* 163, $P < 0{\cdot}001$.

This character places the synonymized *Sch. intermedia* in *Sch. melanocera*.

## ***Schistocerca literosa*** (Walker, 1870)

(Pl. 2, Map 1, Graph 1; Text-figs. 13–24)

*Acridium literosum* Walker, 1870 : 620. Type ♂. 'Galapagos Is.' British Museum (Natural History), London.

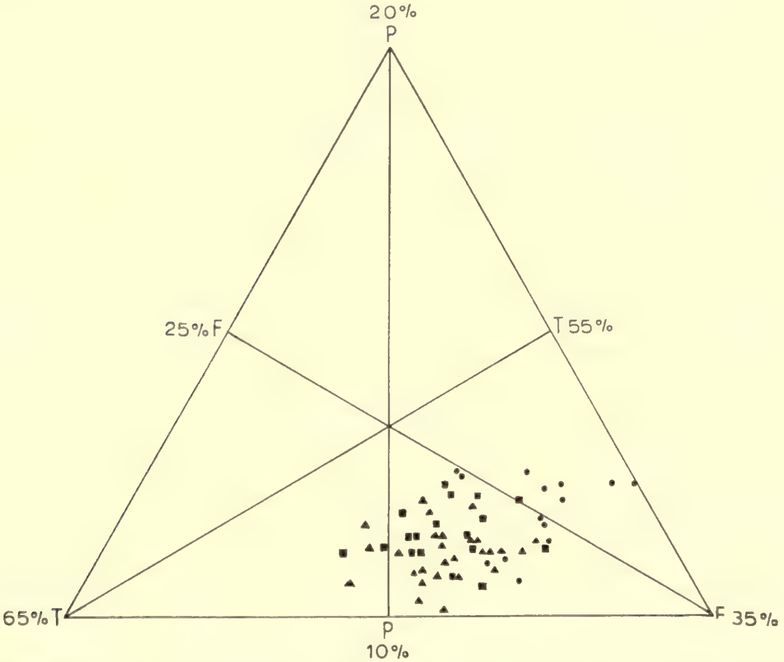
*Schistocerca literosa* (Walker, 1870) (Scudder, 1893 : 15)

*Schistocerca literosa discoidalis* Scudder, 1893 : 16 (Hebard, 1920 : 425). LECTOTYPE ♂. 'Chatham Is., Wreck Bay.' By present selection. Museum of Comparative Zoology, Harvard University, U.S.A. Syntype ♀. Locality and Museum as for Lectotype.

*Schistocerca literosa punctata* Scudder, 1893 : 16. **Syn. n.** Syntype ♀. 'Hood Is.' Museum of Comparative Zoology, Harvard University.

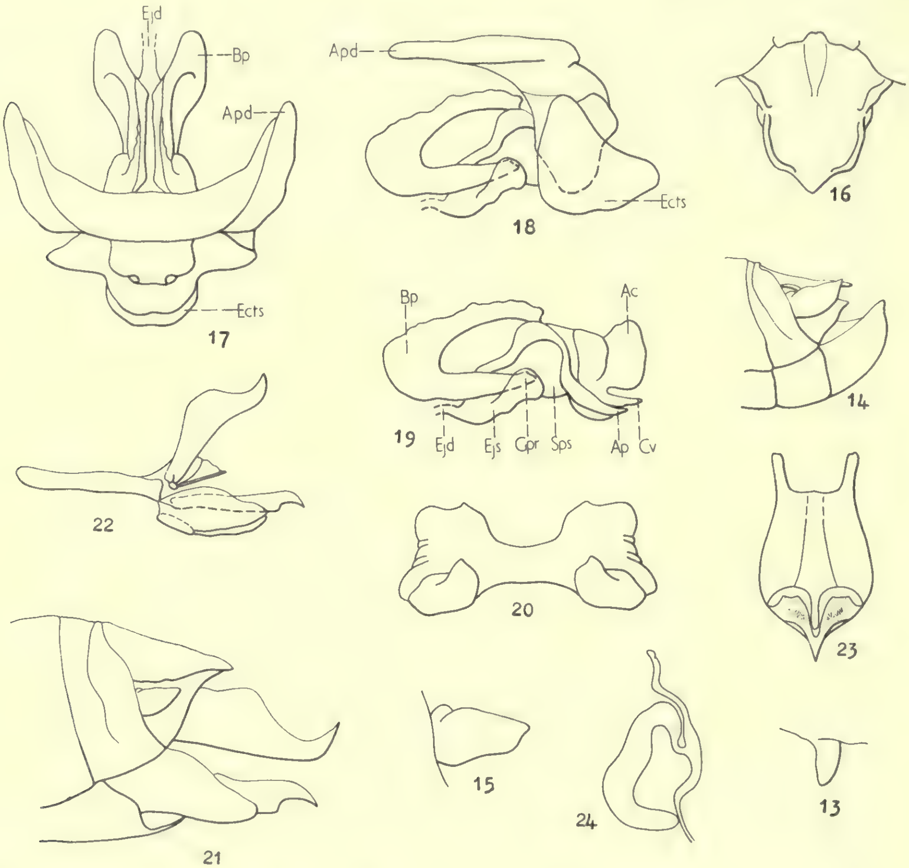
*Schistocerca literosa hyalina* Scudder, 1893 : 16. **Syn. n.** Syntype ♂. 'Tower Is.' Museum of Comparative Zoology, Harvard University.

*S. literosa* can be separated morphometrically (see above) from *Sch. melanocera* by the relatively shorter and wider hind femora.



Graph 1. Triangular co-ordinates showing distribution of proportional values of length of pronotum (P), length of tegmen (T), and length of hind femur (F), expressed as percentages. ●—Chatham Is., ▲—Hood Is., ■—Tower Is. of *S. literosa*.

The three subspecies of *literosa* described by Scudder were attributed by him to three different islands. The differences of characters were tabulated by him, but when the types and topotypical material were studied, it was clear that not a single character or any combination could be used to separate the subspecies. These three forms overlap widely and are present in the population of every island. The populations from Hood and Tower Islands merge completely in every respect, including size (Graph I). The Chatham population overlaps widely but not completely with the populations of Hood and Tower, the tegmina of Chatham specimens being relatively longer (Graph 1), but not so much that it would be advisable to consider them as a separate race. Probably interchange between these islands occurs regularly, so that their populations become almost homogeneously mixed.



FIGS. 13–24. *Schistocerca literosa.* Type. 13–20, ♂: 13, prosternal process; 14, end of abdomen, lateral view; 15, left cercus; 16, supra-anal plate; 17, phallic complex from above (epiphallus and most of ectophallic membrane removed); 18, the same, lateral view; 19, endophallus, lateral view; 20, epiphallus (bridge in horizontal position, whole epiphallus slightly shrunk). 21–24, ♀: 21, end of abdomen, lateral view; 22, sclerotized parts of ovipositor; 23, subgenital plate, inner view; 24, spermatheca.

Redescription. ♂. Of medium size. Integument slightly rugose and pitted. Antenna longer than head and pronotum together. Fastigium of vertex short, obtuse-angular, in middle with rhomboidal depression; frontal ridge low, with margins parallel and slight depression at ocellus. Dorsum of pronotum flattened, slightly constricted in prozona and widened in metazona; metazona slightly longer than prozona, its posterior margin rounded; median carina thin, linear, crossed by three sulci; lateral lobes of prozona concave in middle. Prosternal process from narrow, conical, at apex obtuse, to almost cylindrical. Mesosternal interspace twice as long as its width in middle, slightly constricted and widened in front. Tegmina and wings wide, exceeding end of abdomen. Opening of tympanal organ almost semi-circular, membrane deeply set, forming wide angle with body wall. Hind femur comparatively short and wide, average ratio of length to maximum width 4·47. Hind tibia slightly shorter than femur. Supra-anal plate elongate-angular, in middle of basal part with longitudinal sulcus, which sometimes extends to middle of apical half; sides upcurved and elevated. Cercus narrowing towards apical part, apex oblique, with upper angle protruding. Subgenital plate, in profile, short, moderately narrow, at apex slightly narrowed.

Phallic comlex: of usual structure for the genus; apical valves of penis shorter than valves of cingulum. It differs from *melanocera* in the shape of the basal valves of the penis and in the epiphallus, the latter in *literosa* having more developed and more acute lophi.

Coloration: in general, grey or sometimes brownish. Pronotum uniformly coloured, or mottled with darkish spots, frequently on upper part of lateral lobe or prozona with a small ochraceous spot; tegmen covered with dark brownish spots, sometimes poorly defined, sometimes very sharp; membrane from greyish to transparent colorless; wing hyaline, practically colorless; hind femur above with three transverse brownish fasciae, sometimes extending to outer and partly to inner sides; hind tibia yellowish.

♀. Larger than male. Ovipositor, in profile, comparatively long and narrow; upper valve about one-third as wide as long.

*Measurements*

| | | Length of body | Length of pronotum | Length of tegmen | Length of hind femur | Ratio of length to width of hind femur |
|---|---|---|---|---|---|---|
| ♂ | Range | 27·3–34·5 | 5·1–6·3 | 26·4–35·2 | 13·9–18·9 | 4·1–4·9 |
| | Average | 31·4 | 6·1 | 30·6 | 16·3 | 4·47 |
| ♀ | Range | 34·6–43·4 | 6·7–7·7 | 33·7–43·8 | 17·7–22·6 | 4·0–5·0 |
| | Average | 39·9 | 7·5 | 38·4 | 20·1 | 4·55 |

Geographical distribution: Chatham, Hood, Gardner (near Hood), Tower, Charles, Gardner (near Charles).

## *HALMENUS* Scudder, 1893

Four species of this genus have been described. All of them possess strongly shortened tegmina and wings and cannot fly. They could populate different islands by means of floating debris brought by currents, but there is also the possibility that they were able to fly when the islands were populated and afterwards rapidly lost this ability.

Owing to the loss of the ability to fly, the populations of the islands have been completely or almost completely isolated. As a result, the genus formed species which can be differentiated by external morphological characters and partly by the structure of the phallic complex.

### Key to Species

1 (2) Tegmina overlapping dorsad; anterior margin of tegmen strongly excurved, apex narrowed (Text-fig. 25) . . . . . . . . ***robustus*** Scudd.

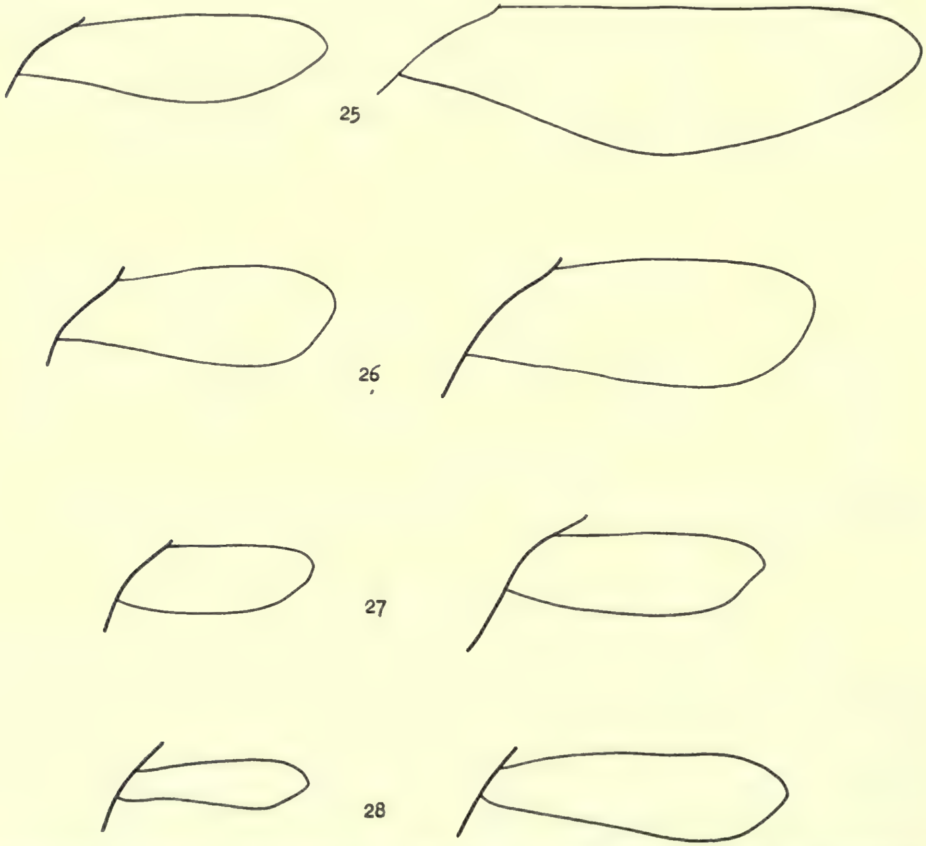
2 (1) Tegmina not overlapping dorsad; anterior margin of tegmen straight or only slightly excurved, apex rounded or slightly attenuate

3 (6) Male cercus narrow, angular, at apex obtuse or acute. Interocular space narrower or as wide as antennal scape. Upper outer margin of upper valve of ovipositor irregularly serrated.

4 (5) Male cercus narrow, at apex acute or subacute. Tegmina reaching or slightly exceeding middle of second abdominal tergite . . . . ***cuspidatus*** Snodgr.

5 (4) Male cercus narrow, comparatively short, at apex obtuse. Tegmina slightly exceeding end of first abdominal tergite . . . ***choristopterus*** Snodgr.

6 (3) Male cercus wide, angular, at apex obtuse, almost rounded. Interocular space wider than antennal scape. Upper margin of upper valve of ovipositor smooth (Text-fig. 51) . . . . . . . . . ***eschatus*** Heb.



Figs. 25–28. Tegmina of *Halmenus*. Left, ♂, right, ♀. 25, *robustus*; 26, *cuspidatus*; 27, *choristopterus*; 28, *eschatus*. All drawn to the same scale.

In the structure of the phallic complex and of the spermatheca, in the shape of the lobes of the mesosternum and in the incised male subgenital plate, *Halmenus* considerably resembles *Schistocerca*. It is different from *Schistocerca* in other respects, but these similarities suggest strong affinity between the two genera and because of them *Halmenus* is here placed in the subfamily Cyrtacanthacridinae.

Type-species: *Halmenus robustus* Scudder, 1893.

### ***Halmenus robustus*** Scudder, 1893

(Pl. 2, Text-figs. 29–39)

♂ (Type. Redescription). Integument finely rugose and pitted. Antenna filiform, shorter than head and pronotum together, 24-segmented. Fastigium of vertex longer than wide, slightly concave in middle, angular, apex obtuse; sides and apex strongly pitted; frontal ridge almost flat; lateral carinulae obliterated; facial carinulae well developed. Pronotum comparatively long, slightly constricted at sides in posterior part; dorsum subcylindrical, crossed by 3 deep sulci; median carina in prozona almost obliterated, in metazona linear, obtuse; metazona much shorter than prozona, its posterior margin obtuse-angular; lateral lobe longer than high, in prozonal part convex, at posterior sulcus concave, lower margin sinuate. Prosternal process narrow, conical. Mesosternal interspace about twice as long as wide, slightly widening towards front; mesosternal lobes long, angular, with angles obtuse. Metasternal interspace strongly elongate, narrow. Tegmina overlapping dorsad, shortened, reaching fourth abdominal tergite, venation coarse. Wings shorter than tegmina. Hind femur moderately slender, exceeding end of abdomen; lower lobes of hind knee rounded. Hind tibia at apical part slightly widened; external apical spine absent. Arolium large, longer than claw. Last abdominal tergite with a pair of large, wide projections. Supra-anal plate angular, longer than wide, apex angularly attenuate; median longitudinal carinula present, bifurcate in basal part; base with a pair of marginal, lateral projections; transverse fold well pronounced. Cercus acute-angular, compressed from sides, at apex acute. Subgenital plate obtusely conical, at apex excised.

General coloration ochraceous. Lateral lobe of pronotum, in upper part of prozona, with shiny, dark brown, wide longitudinal stripe, at lower margin of which there is a narrow yellowish stripe; post-ocular brown stripe similar to pronotal one.

♀. Larger than the male. Ovipositor slender; upper outer margin of upper valve of ovipositor roughly serrated.

Length: ♂ 20·0–23·0, ♀ 26·0–36·2; pronotum ♂ 4·8–5·7, ♀ 6·2–7·2; tegmen ♂ 5·4–6·1, ♀ 7·1–10·9; hind femur ♂ 12·0–13·4, ♀ 14·4–17·0 mm. (Measurements based on material studied by the author.)

Type ♂. Type locality: 'Conway Bay, Indefatigable Island. Galapagos'. Type No. 15335. (It must be considered as a Syntype, since Scudder's description is based on two males and one female.) Museum of Comparative Zoology, Harvard University, U.S.A.

Geographical distribution: Indefatigable, James.

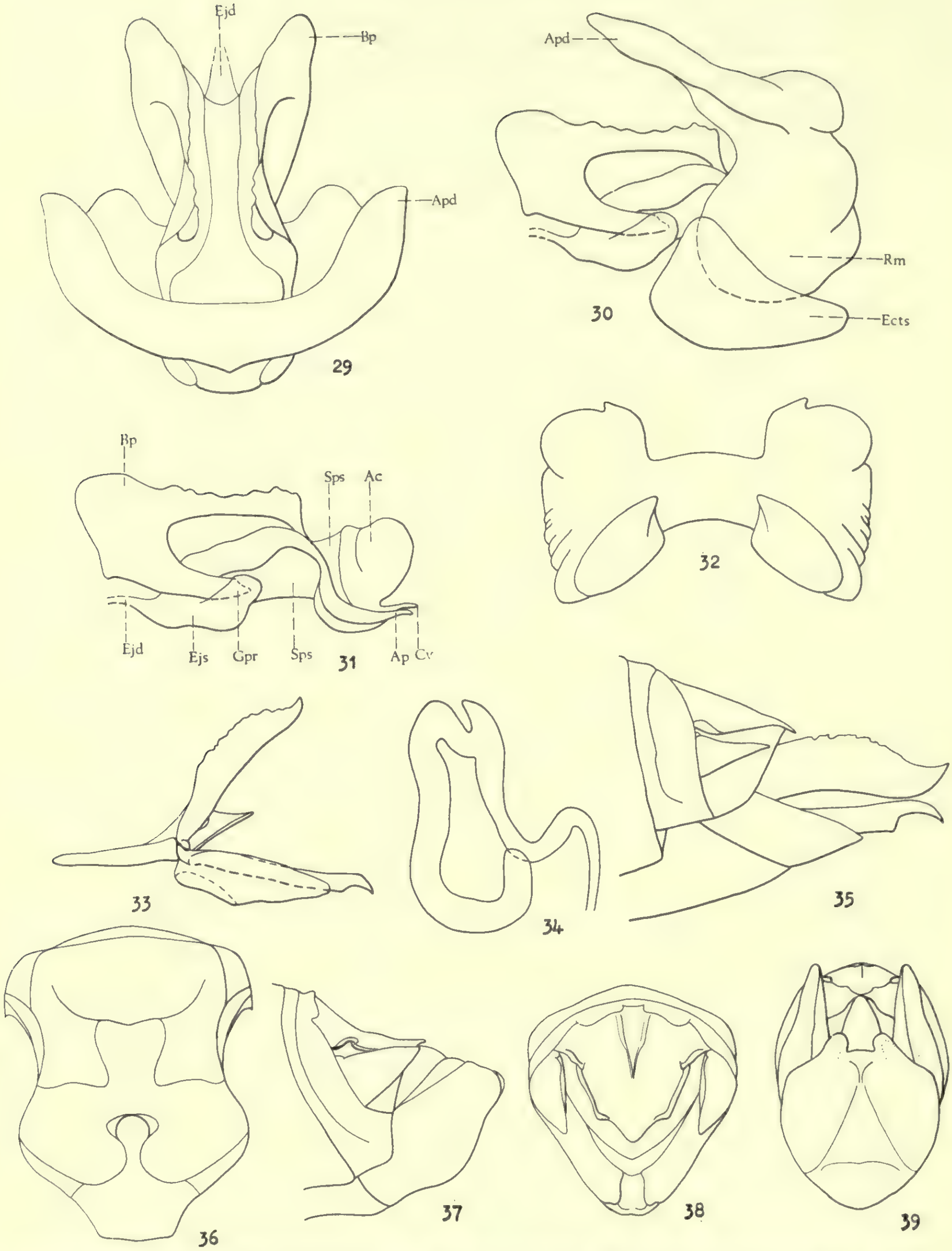
### ***Halmenus cuspidatus*** Snodgrass, 1902

(Text-figs. 26, 40–43)

Differs from other species of the genus in the characters indicated in the key.

In female, upper outer margin of upper valve of ovipositor roughly serrated.

Length: ♂ 19·0–22·8, ♀ 26·4–29·5; pronotum ♂ 4·8–5·0, ♀ 6·4–6·7; tegmen ♂ 4·8–

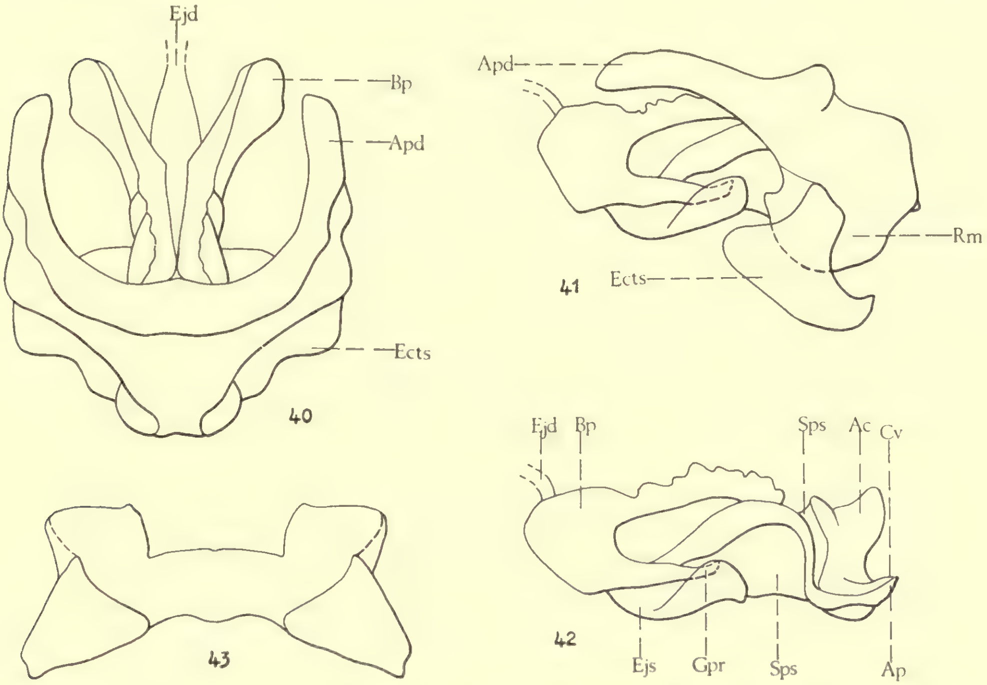

Ejd
Bp
Apd
29
Apd
Rm
Ects
30
Bp
Sps
Ac
Ejd
Ejs
Gpr
Sps
31
Ap
Cv
32
33
34
35
36
37
38
39

FIGS. 29–39. *Halmenus robustus*. 29, phallic complex, from above (epiphallus and most of ectophallic membrane removed); 30, the same, lateral view; 31, endophallus; 32, epiphallus. 33, sclerotized parts of ovipositor; 34, spermatheca; 35, end of abdomen; 36, meso- and metasternum; 37, end of abdomen from lateral view; 38, the same, from above; 39, the same, posterior view, to show excision on end of subgenital plate.

5·0, ♀ 5·2–6·1; hind femur ♂ 12·5–13·6, ♀ 14·8–16·0 mm. (Measurements based on material studied by the author.)

Type ♀. Type locality: Albemarle Is., Iguana Cove. Type lost.

Geographical distribution: Albemarle.



Figs. 40–43. *Halmenus cuspidatus*. Phallic complex. 40, from above (epiphallus and most of ectophallic membrane removed); 41, the same, lateral view; 42, endophallus; 43, epiphallus.

### ***Halmenus choristopterus*** Snodgrass, 1902

(Text-fig. 27)

Differs from the other species of the genus in the characters indicated in the key. Tegmina in both sexes shorter than in *cuspidatus*. In female, upper outer margin of upper valve of ovipositor roughtly serrated.

Length: ♂ 22·3, ♀ 25·1–30·0; pronotum ♂ 5·0, ♀ 6·4–6·5; tegmen ♂ 3·6, ♀ 5·9–6·1; hind femur ♂ 13·4, ♀ 14·7–17·2 mm. (Measurements based on material studied by the author).

Type ♀. Type locality: Charles Is. Type lost.

Geographical distribution: Known only from Charles Is.

### ***Halmenus eschatus*** Hebard, 1920

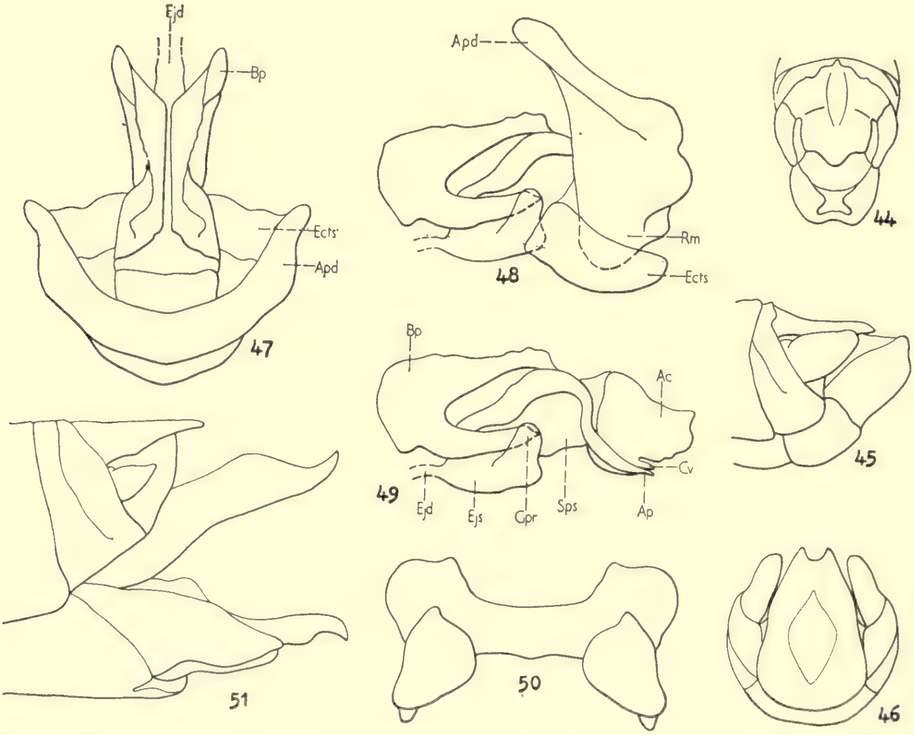
(Pl. 3, Text-figs. 44–51)

This is the most divergent species of the genus. Characters additional to those mentioned in the key are: tegmina in both sexes micropterous, being fully lateral and more strongly reduced than in other species; and interocular space much wider than in others.

Measurements: length: ♂ 20·8–23·5, ♀ 27·0–32·8; pronotum ♂ 5·2–5·9, ♀ 7·0–7·9; tegmen ♂ 3·5–4·0, ♀ 5·0–6·2; hind femur ♂ 10·4–11·3, ♀ 13·2–14·5 mm.

Type ♀. Type locality: ' Wenman Is.' Museum of California, Academy of Sciences. (Type No. 717.)

Geographical distribution: Known from type locality only.



FIGS. 44–51. *Halmenus eschatus.* Paratypes. 44, end of abdomen from above; 45, the same, lateral view; 46, the same, posterior view, to show excision of apex of subgenital plate; 47, phallic complex from above (epiphallus and most of ectophallic membrane removed); 48, the same, lateral view; 49, endophallus; 50, epiphallus; 51, ♀, end of abdomen, lateral view.

## ***Desmopleura concinna*** Scudder, 1893

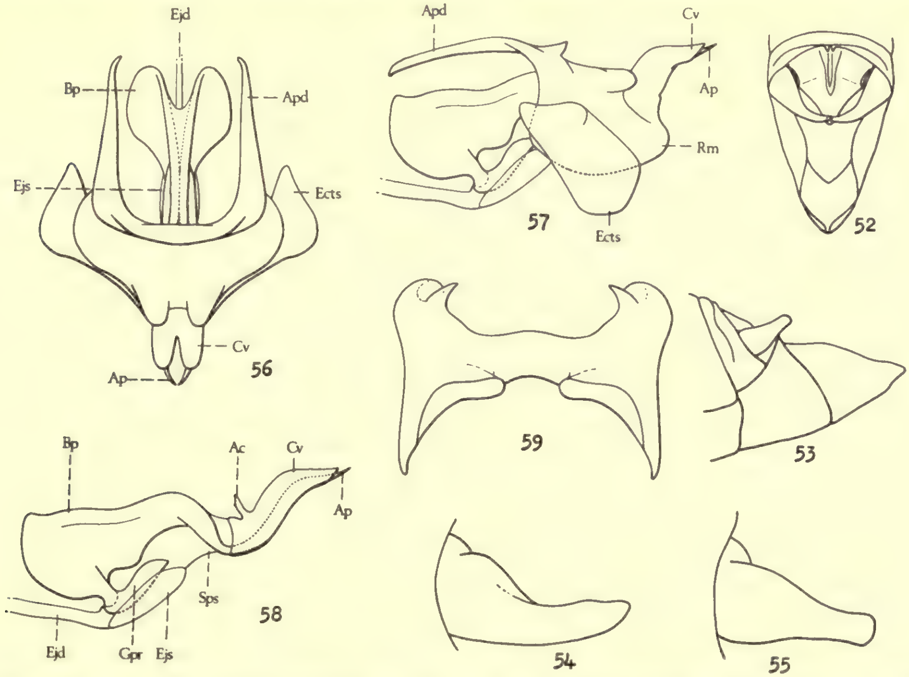
(Pl. 4, Text-figs. 52–59)

This genus belongs to subfamily Catantopinae of Acrididae, and probably to the group Podismini judging from the structure of the phallic complex.

No genus examined from the American continent is closely allied to *Desmopleura*. It may perhaps be related to the genus *Dichroplus*, but if so the relationship is rather remote.

Since only the male type is known, there is no possibility of studying it in detail and further material is needed.

♂ (Type. Redescription). Small. Integument slightly pitted. Antenna filiform, slightly shorter than head and pronotum together. Head obtuse, conical. Fastigium of vertex short obtuse-angular, sloping fowards, in middle with deep sulcus bordered by a pair of high, strong lateral carinulae which extend beyond base of vertex; linear median carinula running from middle of fastigium along whole head; frons oblique, ftonral ridge narrow, sulcate, lateral carinulae obtuse. Pronotum subcylindrical, dorsum flattened, crossed by 4 fine sulci; median carina linear, crossed by posterior and preposterior sulci; lateral carinae absent; anterior margin straight, posterior broadly obtuse-angular; lateral lobe longer than high, margin excurved in middle, transverse sulci deep and comparatively wide. Prosternal process tongue-shaped, inclined backwards and touching mesosternum. Mesosternal interspace longer than wide;



FIGS. 52–59. *Desmopleura concinna*. Type. 52, end of abdomen, from above; 53, the same, lateral view; 54, cercus, from above; 55, the same, lateral view; 56, phallic complex from above (epiphallus and most of ectophallic membrane removed); 57, the same, lateral view; 58, endophallus; 59, epiphallus.

lateral lobe longer than wide, with rounded angle. Metasternal interspace elongate, closed. Tegmina and wings fully developed. Tegmen exceeding end of hind femur, rather narrow, reticulation sparse. Wing comparatively narrow, as long as tegmen. Tympanum well developed, large. Anterior and middle femora slightly inflated. Hind femur short and moderately slender. Lower basal lobe of hind knee rounded. External apical spine of hind tibia absent. Arolium large. Last abdominal tergite with a pair of small, narrow projections in middle. Supra-anal plate short, angular, at apex obtuse. Cercus wide in basal part, narrowing towards apex, which is strongly incurved; apex obtuse. Subgenital plate in profile elongate, narrow conical.

Phallic complex: Similar to that of the group Podismini: apical valve and valve of cingulum of penis covered by sheath; apical valves long, slender, at apices acute; valves of cingulum in profile slender, above fused, shorter than apical valves of penis; basal valves of penis large, strongly expanded; zygoma very large; apodemes slender, forming U-shaped structure. Epiphallus wide-bridged; ancorae small, acute, inclined inwards; lophi long and narrow, forming narrow lobes.

General coloration buff; from posterior margin of eye and extending along upper part of lateral lobe of pronotum, a wide blackish stripe; from apex of fastigium of vertex to posterior margin of pronotum, a dark brown stripe; carinula on head and median carina of pronotum lighter coloured than stripe; veins and veinlets of tegmen and wing brownish, membrane colorless. (Other parts of type specimen discolored due to previous preservation in fluid.)

Measurements: Length: 13·5, pronotum 3·2; tegmen 11·0; hind femur 9·0 mm.

Type ♂. Type locality: 'James Island'. United States National Museum, Washington.

## ***Closteridia bauri*** Scudder, 1893

(Pl. 5, Text-figs. 60–66)

♂. Of medium size, robust. Integument strongly rugose and granulose. Antenna filiform, longer than head and pronotum together, 20-segmented. Head subconical; fastigium of vertex acute-angular, as long as wide, lateral margins raised, median carinula well developed, fastigial foveolae narrow-rhomboidal, deep, with prominent edges; frons inclined backwards, frontal ridge narrow, sulcate, lateral carinulae high, almost parallel, slightly diverging basally; facial carinulae high, slightly excurved; weak occipital carinula present. Pronotum subcylindrical, widened backwards, dorsum indistinctly separated from lateral lobes; median carina irregularly linear, in prozona slightly raised; lateral carinulae lyrate, limiting narrow elevation of dorsum; transverse sulci indistinct; posterior margin of metazona corrugated; posterior angle of lateral lobe roundly protruding backwards. Prosternal process absent. Mesosternal interspace twice as wide as long. Metasternal interspace wider than long. Tegmina vestigial; wings and tympanum absent. Metanotum and first abdominal tergite with rough median carinula. Hind femur short, stout, reaching end of abdomen. Lobes of hind knee with apices rounded. Hind tibia slightly shorter than femur; external apical spine absent; spurs short, of equal length; arolium slightly longer than half length of claws. Last abdominal tergite slightly and regularly incurved. Supra-anal plate slightly longer than wide, angular, at apex obtuse, slightly incurved, in basal part with small median concavity, transverse ridge in middle well developed. Cercus short, conical. Subgenital plate short, subconical.

Phallic complex: of Acridinae type. Apical valve of penis short, much shorter than valves of cingulum; basal valves large and strongly expanded; apodemes relatively small, forming wide, arch-like structure. Epiphallus robust, ancorae large, inclined inwards; lophi very large, irregularly bilobate.

General coloration rust-brown, mottled with dark brown spots; head above and dorsum of pronotum lighter, dirty ochraceous; outer and inner sides of hind femur with two transverse, brown fasciae; hind tibia dirty ochraceous.

♀ (Type). See original description.

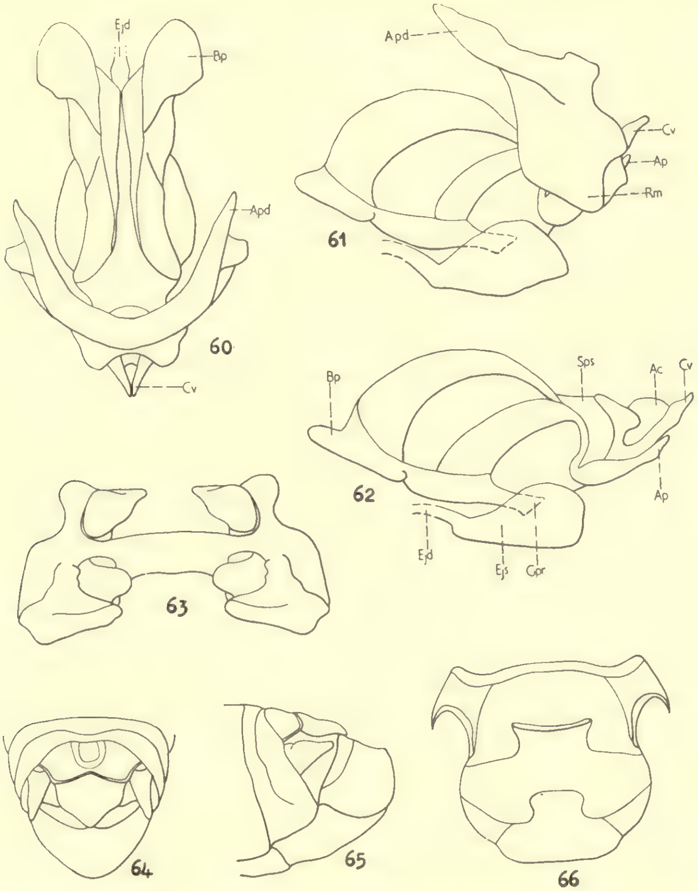
Length: ♂ 20·0, ♀ 22·0; pronotum ♂ 4·3, ♀ 4·5; tegmen ♂ 0·3, ♀ absent (?); hind femur ♂ 11·0, ♀ 13·5 mm.

Type ♀ (lost). Type locality ' Wreck Bay, Chatham Is.'

♂. Described by Hebard (1920) and redescribed above. Cowley Mountain, Albemarle Is. Museum of the California Academy of Sciences.

Only two specimens of this remarkable genus and species are known; and since the female type is lost, it is not possible to verify that both specimens belong to the same species. They are practically wingless and were collected on different and widely separated islands.

This genus is of the subfamily Acridinae of Acrididae (*sensu* Dirsh, 1961). No close relatives of it are known from America and its phylogenetic relationship is obscure.



FIGS. 60–66. *Closteridia bauri.* 60, phallic complex from above (epiphallus and most of ectophallic membrane removed); 61, the same, lateral view; 62, endophallus; 63, epiphallus; 64, end of abdomen, from above; 65, the same, lateral view; 66, meso- and metasternum.

## *SPHINGONOTUS* Fieber, 1852

It was rather surprising to find the genus *Sphingonotus* represented on the remote Galapagos Islands. This presents a puzzling zoogeographical problem, even though *Sphingonotus* is the most widely distributed genus of all Acridoidea. It occurs over the whole of Europe, Africa, most of Asia (including Japan), Australia, Jamaica, Ecuador and the Galapagos Islands.

The most numerous specific complex of the genus occurs in Central and South-west Asia and in the palaearctic part of Africa.

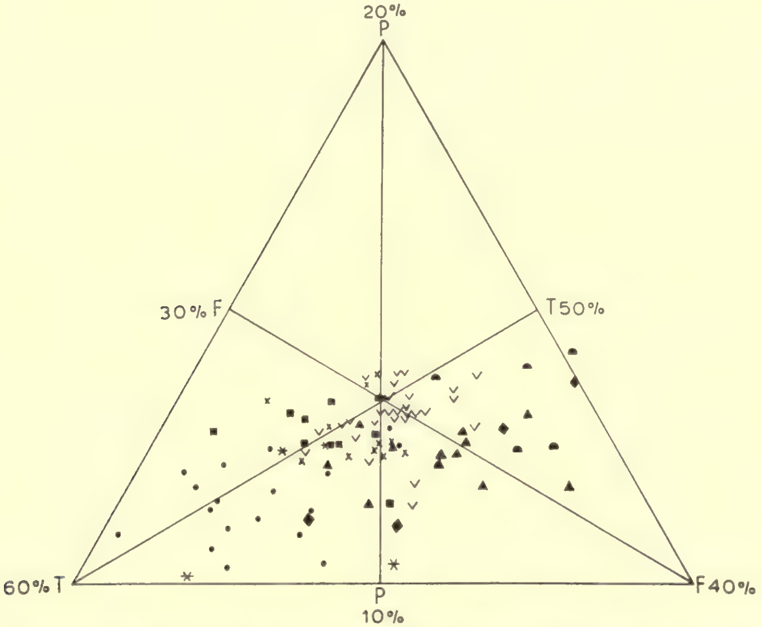
It is a peculiar fact that the species from Galapagos (Text-figs. 67–70), Jamaica (Text-figs. 71–74), and the type-species *S. caerulans* (Text-figs. 75–79) from Sweden have remarkably similar phallic complexes. (The one known specimen from Ecuador, actually from Puna Island, is a female, but externally it is very similar to the species from Galapagos.)

This indicates a relatively recent separation of these species and a relatively recent penetration by them to America and the Galapagos Islands. We have no indication of how this occurred. The distances between the Palaearctic Region, Jamaica, Ecuador and Galapagos are enormous, and *Sphingonotus* has not so far been found in intervening countries. At present it is only possible to affirm a close affinity between the species on the basis of morphological characters, leaving zoogeographical considerations until more data become available.

Stål in 1860 described *Oedipoda fuscoirrorata* (at present *Sphingonotus fuscoirroratus*) from two females from ' Galapagos ' and one female from Puna Island, about two miles from the coast of Ecuador. Snodgrass (1902), who considered the specimen from Puna Island different from the Galapagos specimens, restricted the name *fuscoirrorata* Stål to the specimen from Puna Island and gave new names, *trinesiotis* and *tetranesiotis*, to two alleged species from Galapagos, which include Stål's specimens, on the grounds that Stål did not fix the type locality. Here Snodgrass' action is considered incorrect and not valid, on the grounds that Stål had two females from Galapagos and one female from Puna Island and in his original description mentioned their localities as ' Galapagos Is. and Puna Is.', not vice versa as stated by Snodgrass. For this reason Stål's name *Oedipoda fuscoirrorata* Stål, 1860 is accepted here as the original name for the Galapagos species, but for the specimen from Puna Island the specific name ***punensis* nom. n.** is proposed.

In the same paper Snodgrass (1902), who assigned *trinesiotis* and *tetranesiotus* to *Sphingonotus*, described three subspecies of the former and four of the latter. Hebard (1920) synonymized all of them, including the specimen from Puna Island, under Stål's original name *fuscoirrorata.* In the light of the present study Hebard's synonymy is correct, except for the specimen from Puna Island whose position is doubtful as only one specimen is known. From the present author's point of view it seems preferable to retain the specimen from Puna Island as a separate species of *Sphingonotus*. By all external characters, this specimen is very similar to the Galapagos species, except that the metazona of the pronotum (Pl. 7) is relatively shorter and its posterior margin is widely obtuse-angular, almost rounded, while in the Galapagos species it is acute-angular, and obtuse only at the apex (Pl. 6).

A study of the series of the species and subspecies of Snodgrass from the topotypical localities shows that they cannot be separated by external morphological characters or by the phallic complex. When studied morphometrically they display some tendency towards forming races on the different islands. When three morphometric characters (length of pronotum—*P*, length of tegmen—*T* and length of hind femur—*F*) are studied and plotted as triangular co-ordinates (Graph 2) these various forms show such a tendency, but they overlap so widely that to consider them as races would be stretching the point too far. Probably, in spite of being small and not such good fliers as *Schistocerca*, they can still fly from island to island, levelling the morphological and morphometric features of the population.



Graph 2. Triangular co-ordinates showing distribution of proportional values of length of pronotum (P), length of tegmen (T) and length of hind femur (F), expressed as percentages. ●—Hood Is., ▲—Indefatigable Is., ■—Charles Is., ×—Narborough Is., V—Albemarle Is., *—Chatham Is., ◆—Abingdon Is., ◓—James I.

## ***Sphingonotus fuscoirroratus*** (Stål, 1860)

(Pl. 6, Text-figs. 67–70)

*Oedipoda fuscoirrorata* Stål, 1860 : 345 (partim). LECTOTYPE ♀ ' Galapagos Is.' by present selection. Stockholm Museum.

*Sphingonotus trinesiotis* Snodgrass, 1902 (Hebard, 1920 : 321).

*Sphingonotus trinesiotis chathamensis* Snodgrass, 1902 : 437 (Hebard, 1920 : 321). Type ♂, lost.

*Sphingonotus trinesiotis indefatigabilensis* Snodgrass, 1902 : 437 (Hebard, 1920 : 321). Type ♂, lost.

*Sphingonotus trinesiotis albemarlensis* Snodgrass, 1902 : 437 (Hebard, 1920 : 321). Type ♂, lost.

*Sphingonotus tetranesiotis* Snodgrass, 1902 : 437 (Hebard, 1920 : 321).

*Sphingonotus tetranesiotis charlesensis* Snodgrass, 1902 : 437 (Hebard, 1920 : 321). Type ♂, lost.

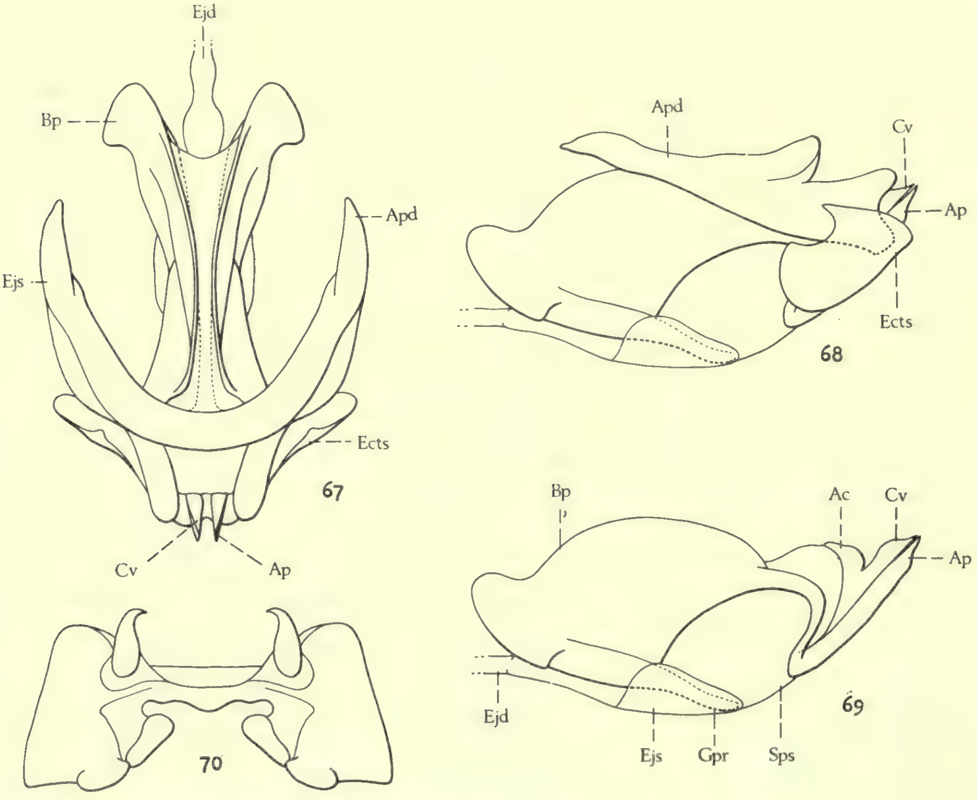
*Sphingonotus tetranesiotis barringtonensis* Snodgrass, 1902 : 437 (Hebard, 1920 : 321). Type ♂, lost.

*Sphingonotus tetranesiotis hoodensis* Snodgrass, 1902 : 438 (Hebard, 1920 : 321). Type ♂, lost.

*Sphingonotus tetranesiotis indefatigabilensis* Snodgrass, 1902 : 438 (Hebard, 1920 : 321). Type ♂, lost.

The female specimen of *Oedipoda fuscoirrorata* Stål, 1860 which was quoted in Sjöstedt's 1932 paper as the type is selected here and described below as lectotype. All three of Stål's original specimens were studied.

Redescription. ♀ Lectotype. Integument rugose and granulose. Antenna shorter then head and pronotum together. Fastigium of vertex sloping forwards, concave and widening in front; lateral and median carinulae well developed; frontal ridge slightly widening at ocellus, constricted below ocellus and undulating below. Pronotum rugose and granulose, dorsum crossed by 3 sulci; median carina slightly elevated in front of anterior sulcus, obliterated between



FIGS. 67–70. *Sphingonotus fuscoirroratus*, from Charles Is. 67, phallic complex, from above (epiphallus and most of ectophallic membrane removed); 68, the same, lateral view; 69, endophallus; 70, epiphallus.

anterior and posterior sulci and sharply linear in metazona; in front of posterior sulcus a concavity with a pair of small elevations posteriorly; metazona about half as long again as prozona, its posterior end acute-angular, apex obtuse, sides undulated; anterior angle of lateral lobe of pronotum obtuse-angular, posterior angle with acute-angular projection. Tegmina exceeding end of abdomen; intercalary vein of medial area almost parallel to medial vein. Mesosternal interspace short, twice as wide as long. Subgenital plate at apex truncate. Ovipositor short, valves curved at apices; lower valve with angular, lateral, external projection.

General coloration brownish; tegmen with 2 dark brown transverse fasciae and with small spots in apical part; wings hyaline, slightly infumate.

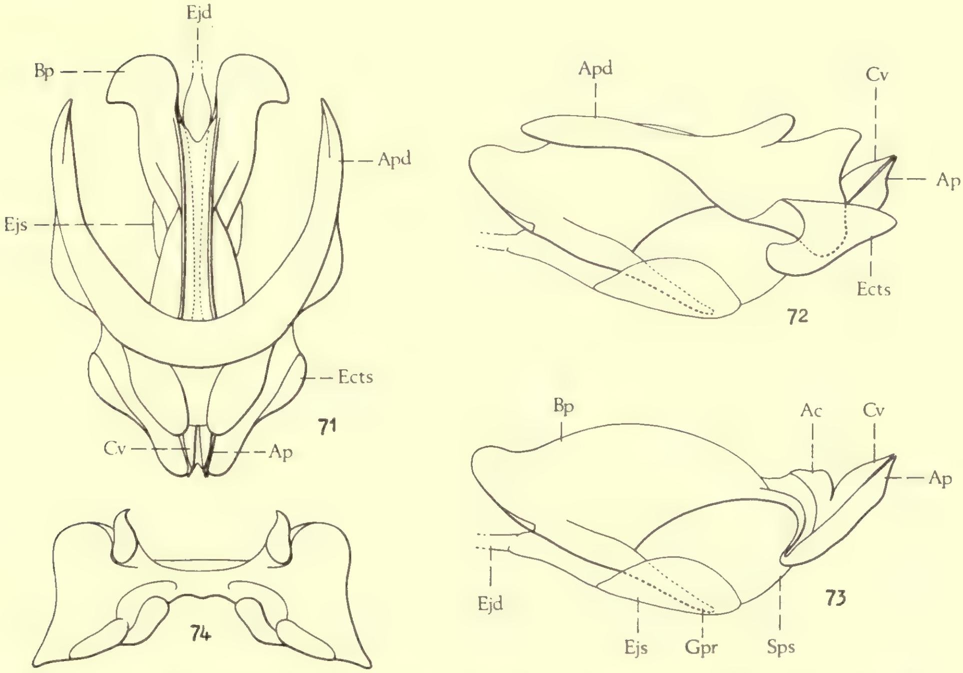
♂. Much smaller than female. Antenna longer than head and pronotum together. Fastigium of vertex more sloping forwards, narrower, more concave. Last abdominal tergite with a pair of small, rounded projections; supra-anal plate short, angular. Cercus narrow-conical, at apex obtuse. Subgenital plate short, obtusely subconical.

Phallic complex of usual type for the genus (see Text-figs. 67–70).

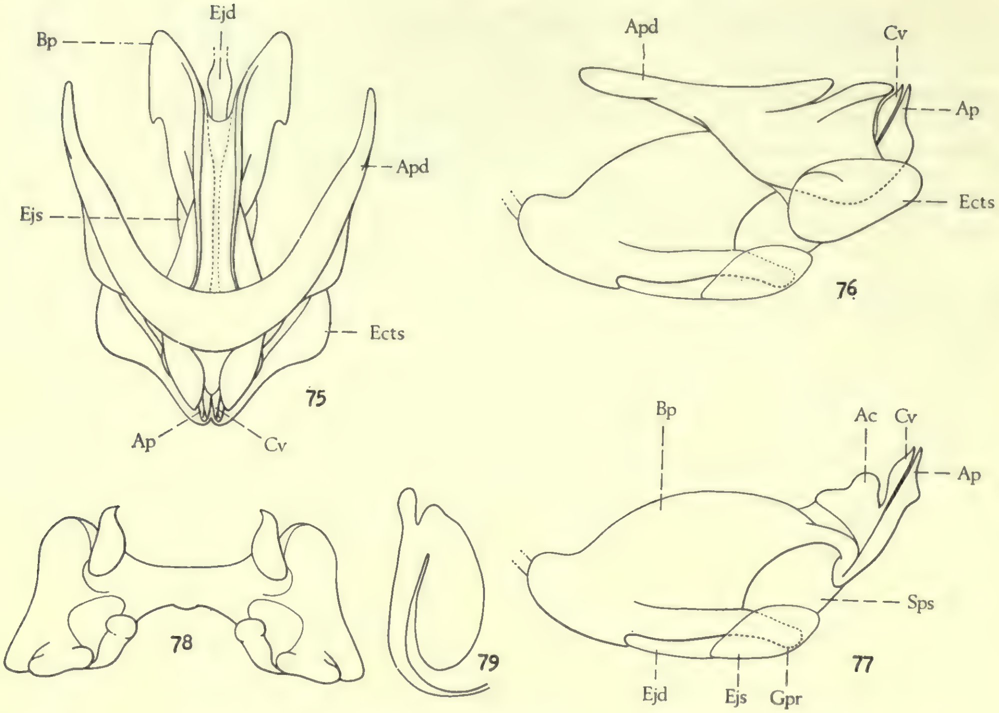
General coloration as in female; wing more infumate.

*Measurements* (mm.)

| | | Length of body | Length of pronotum | Length of tegmen | Length of hind femur |
|---|---|---|---|---|---|
| ♂ | Range | 10·9–17·7 | 2·3–3·5 | 9·3–14·8 | 6·4–10·2 |
| | Average | 13·8 | 2·9 | 12·6 | 7·9 |
| ♀ | Range | 16·1–24·0 | 3·2–4·6 | 13·8–21·2 | 8·4–12·9 |
| | Average | 20·8 | 4·0 | 17·3 | 10·7 |



FIGS. 71–74. *Sphingonotus jamaicensis* (Saussure, 1884). 71, phallic complex, from above (epiphallus and most of ectophallic membrane removed); 72, the same, lateral view; 73, endophallus; 74, epiphallus.
]



FIGS. 75–79. *Sphingonotus caerulans* (Linnaeus, 1767). 75, Phallic complex from above (epiphallus and most of ectophallic membrane removed); 76, the same, lateral view; 77, endophallus; 78, epiphallus; 79, spermatheca.

Lectotype ♀. Lectotype locality ' Galapagos Is.' Stockholm Museum.

Geographical distribution: Abingdon, Albemarle, Barrington, Charles, Chatham, Gardner (near Hood), Hood, Indefatigable, James, Jervis, Narborough, Seymour (both).

## REFERENCES

BOWMAN, R. J. edit. 1966. *The Galapagos*. Proceedings of the Symposia of the Galapagos International Scientific Project. Univ. of California Press : 1–318.

CAUDELL, A. N. 1932. Insects of the Order Orthoptera of the Pinchot Expedition of 1929. No. 2921, *Proc. U.S. natn. Mus.* **80**, art. 21 : 1–7.

COX, A. 1966. Continental Drift in the Southern Hemisphere. *The Galapagos*. Proc. of the Sympos. of the Galap. Intern. Scient. Project. Univ. of California Press.

COX, A. & DALRYMPLE, G. B. 1966. Palaeomagnetism and Potassium-Argon ages of some volcanic rocks from the Galapagos Islands. *Nature, Lond.* **209**, No. 5025 : 776–7.

EIBL-EIBESFELDT, J. 1960. *Galapagos*. MacGibbon & Kee, London.

GRESSITT, J. L. 1964. *Pacific Basin Biogeography*. Bishop Museum Press, Honululu.

HEBARD, M. 1920. Dermaptera & Orthoptera. Expedition of the California Academy of Sciences to the Galapagos Islands, 1905–1906. 17. *Proc. Calif. Acad. Sci.* (4), **2** : 311-346, text-figs. I–II.

HEBARD, M. 1934. Orthoptera of the Galapagos Islands. *Meddr. zool. Mus., Oslo* Nr. 41. (Saertryk av Nyt Magazin for Naturvidenskaberne **74**).

LINSLEY, E. G. & USINGER, R. L. 1966. Insects of the Galapagos Islands. *Proc. Calif. Acad. Sci.* **33**, No. 7 : 113–196.

ORR, R. T. 1966. Evolutionary Aspects of the Mammalian Fauna of the Galapagos. *The Galapagos.* Proc. of the Sympos. of the Galap. Intern. Scien. Project. Univ. of California Press.

SCUDDER, S. H. 1893. Reports on the dredging operations off the West Coast of Central America to the Galapagos, to the West Coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U.S. Fish Commission steamer 'Albatross', during 1891, Lieut. Commander Z. L. Tanner, U.S.N., commanding. XII. The Orthoptera of the Galapagos Islands. *Bull. Mus. comp. Zool. Harv.* **25**, no. 1 : 1–25, pls. 2.

SJÖSTEDT, Y. 1932. Orthopterentypen im Naturhistorischen Reichsmuseum zu Stockholm. 2. *Acrididae. Ark. Zool.* **24** A No. 1 : 1–89, 20 pls.

SNODGRASS, R. E. 1902. Papers from the Hopkins Stanford Galapagos Expedition, 1898–1899. VIII. Entomological Results (7). *Schistocerca, Sphingonotus* and *Halmenus. Proc. Wash. Acad. Sci.* **4** : 411–454, 2 pl.

STÅL, C. 1861. Orthoptera species novas descripsit C. Stål. In *Kongliga Svenska Fregatten Eugenies Resaomkring jorden under befäl af C. A. Virgin, åren* 1851–1853. **2**, Zoologi. Insecta, **10** : 299–350. P. A. Norstedt, Stockholm.

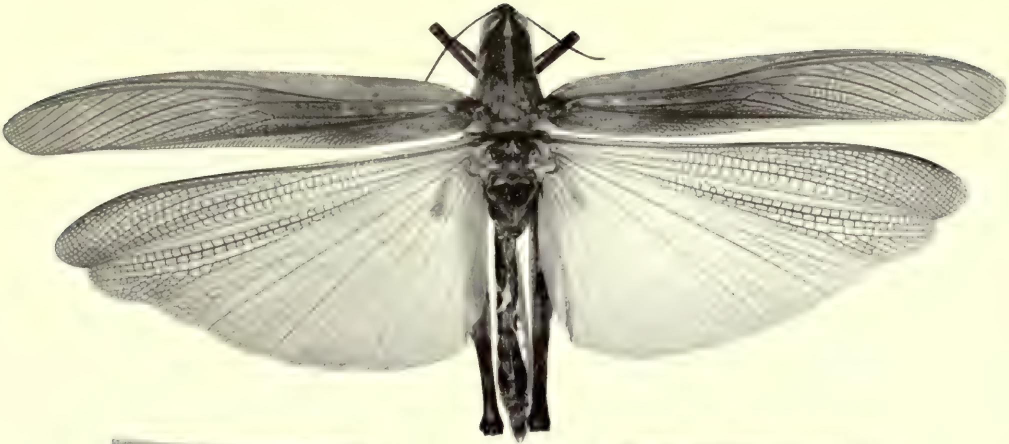
VAN DENBURGH, J. 1914. The gigantic tortoises of the Galapagos Archipelago. *Proc. Calif. Acad. Sci.* (4), **2** (1) : 203–374.

WILLIAMS, H. 1966. Geology of the Galapagos Islands. *The Galapagos.* Proc. of the Sympos. of the Galap. Intern. Scient. Project. 65–70. Univ. of California Press.

WOOSTER, W. S. & HEDGPETH, J. W. 1966. The Oceanographic Setting of the Galapagos. *The Galapagos.* Proc. of the Sympos. of the Galap. Intern. Scient. Project. Univ. of California Press.

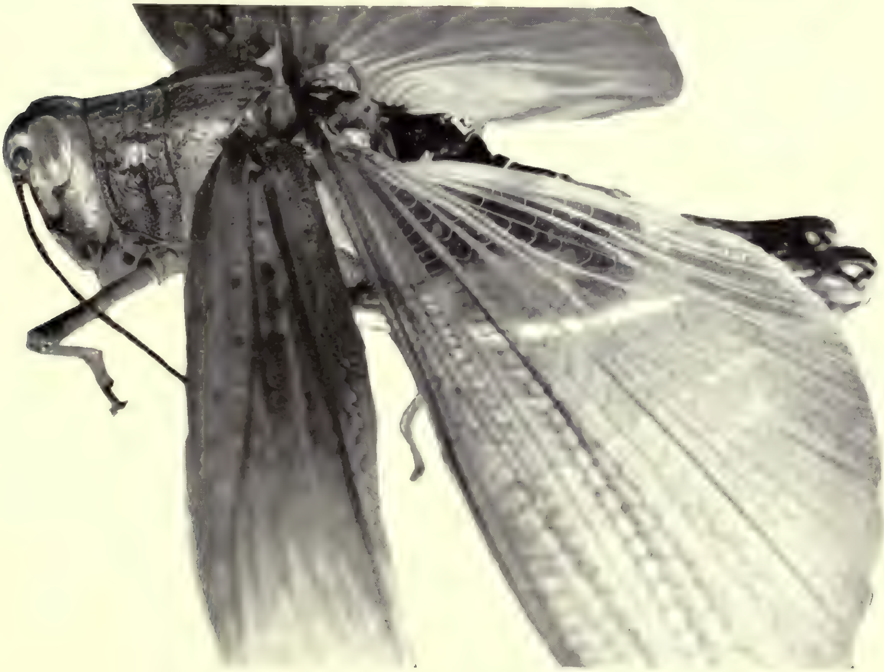
## PLATE 1

*Schistocerca melanocera.* Type. Dorsal and lateral views, with original Stål labels.



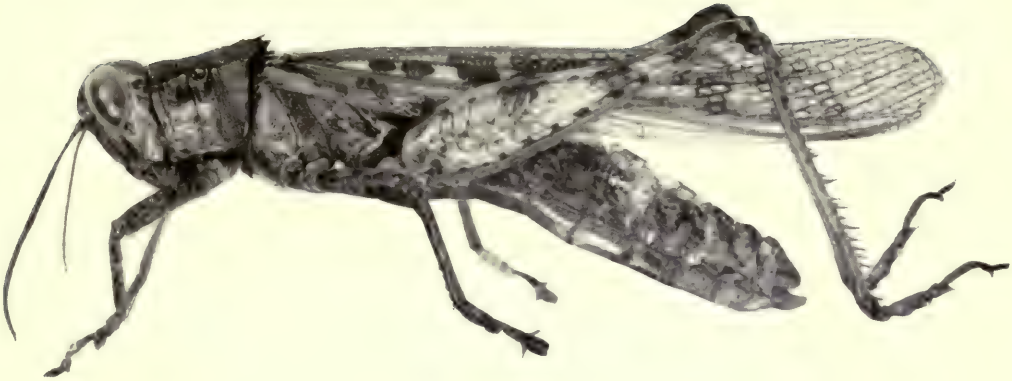
Schistocerca ♂ Stål

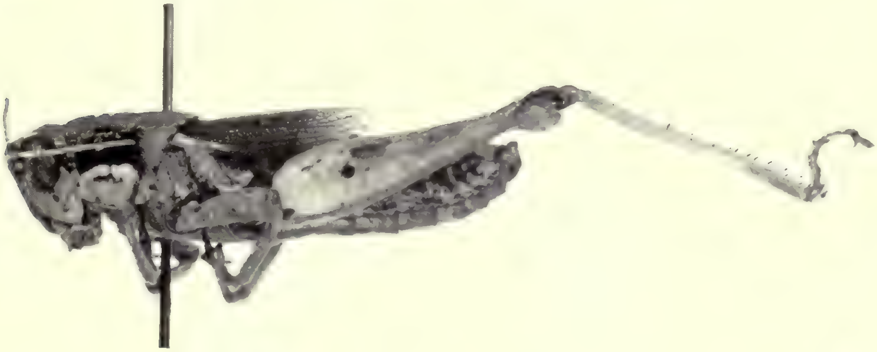
melanocerum Stål



## PLATE 2

Above, *Schistocerca literosa*. Type. Below, *Halmenus robustus*. Syntype. Lateral view (black spot in middle of hind femur is hole left by pin); and dorsal view (position of tegmina slightly disarranged, owing to previous preservation in liquid; normally they overlap).





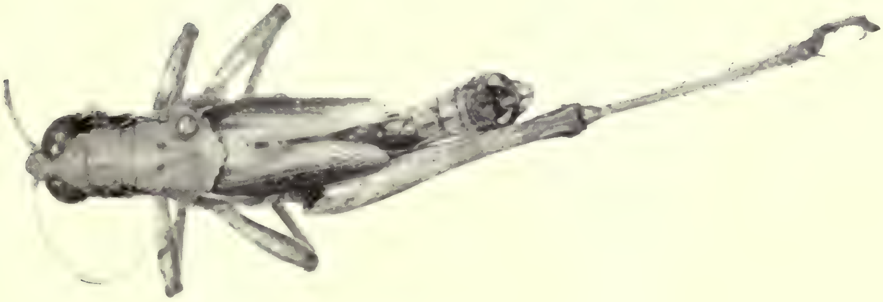
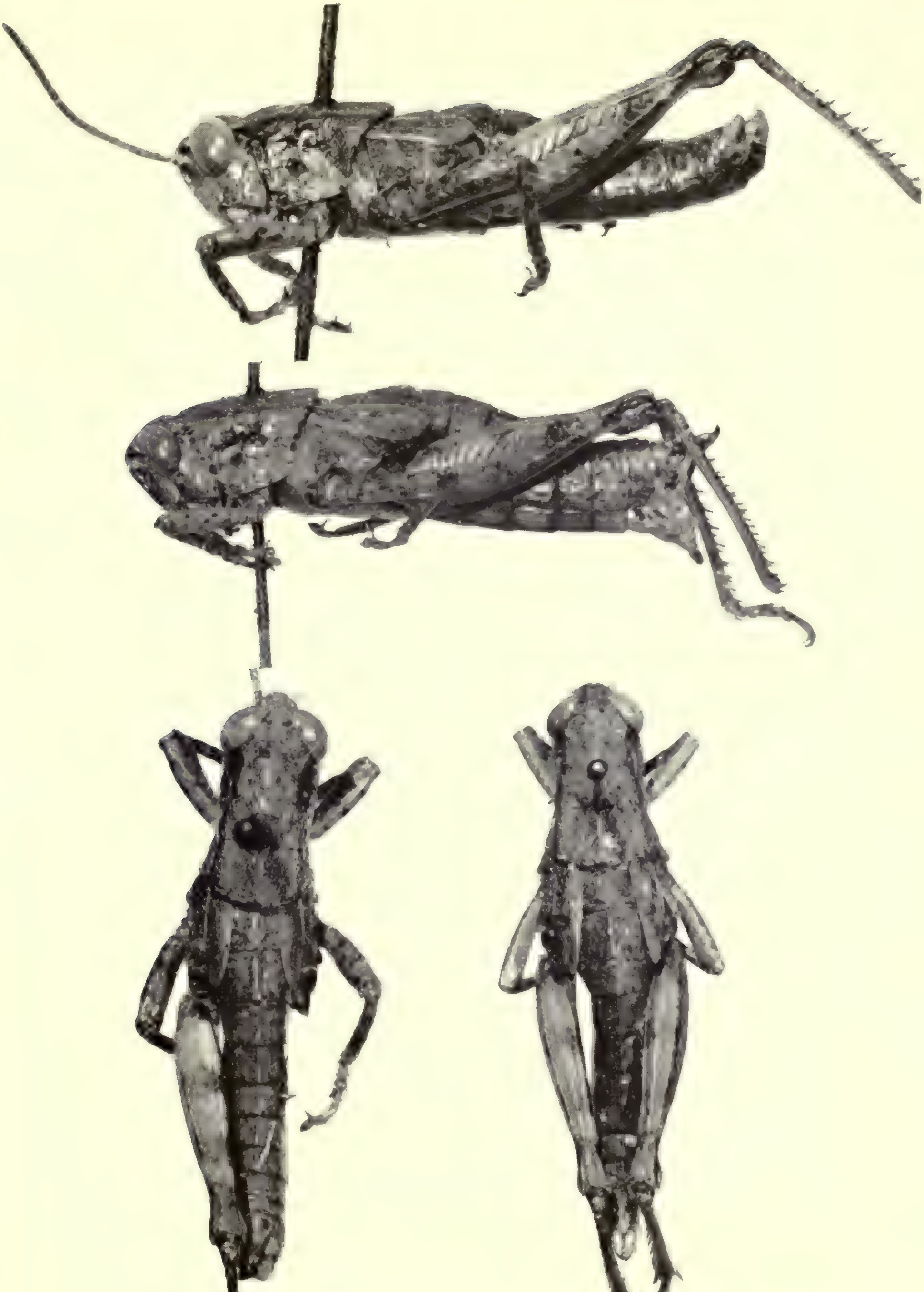


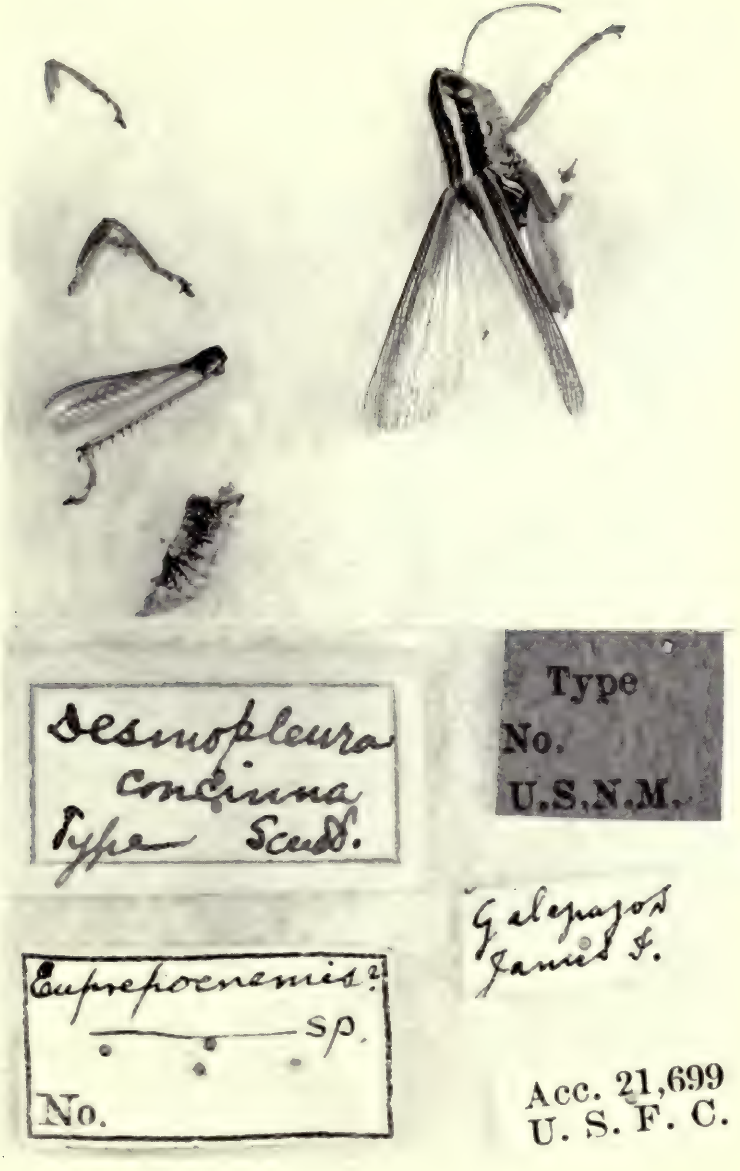
PLATE 3

*Halmenus eschatus.* ♂ and ♀ paratypes, dorsal and lateral views.



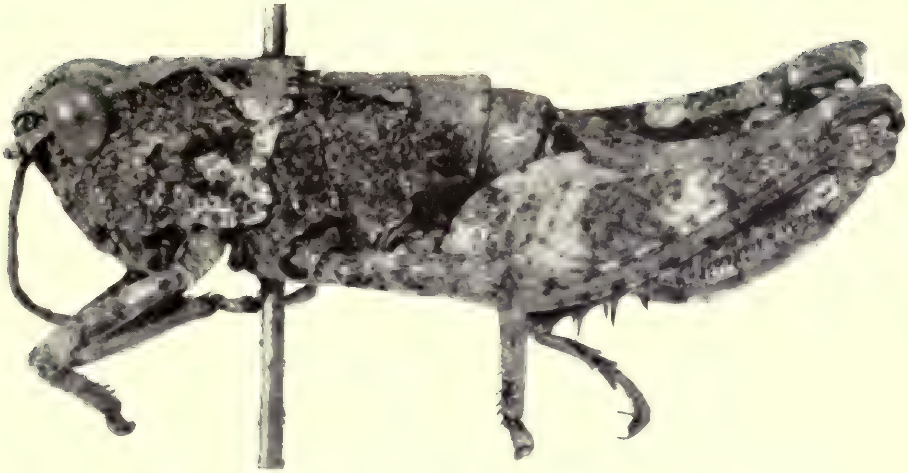
## PLATE 4

*Desmopleura concinna.* Type and the labels attached to it.


Desmopleura
concinna
Type Scudd.
Type
No.
U.S.N.M.
Galapagos
James I.
Euprepocnemis?
sp.
No.
Acc. 21,699
U. S. F. C.

## PLATE 5

*Closteridia bauri.* ♂ (the specimen described by Hebard, 1920).



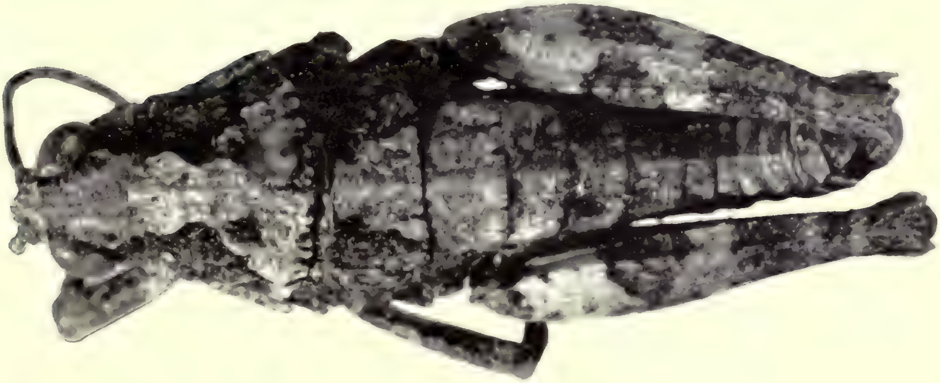
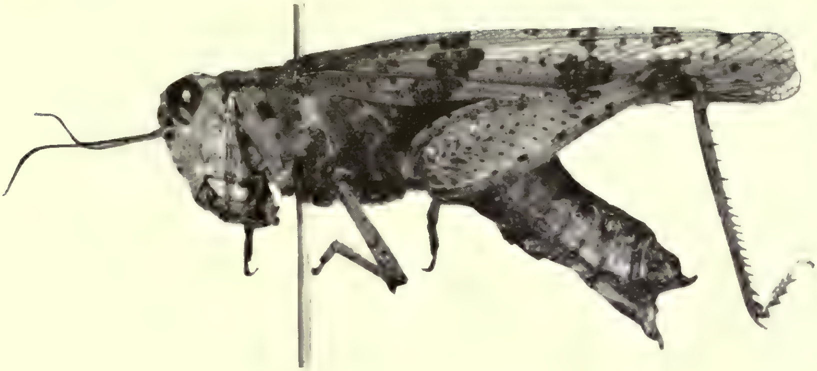


PLATE 6

*Sphingonotus fuscoirroratus*. Lectotype. Lateral view and from above.



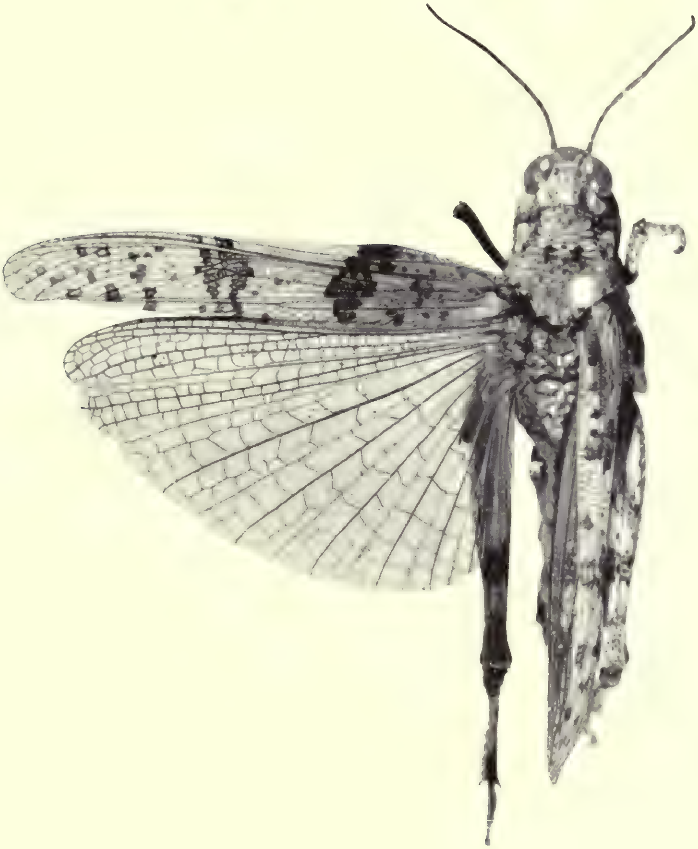
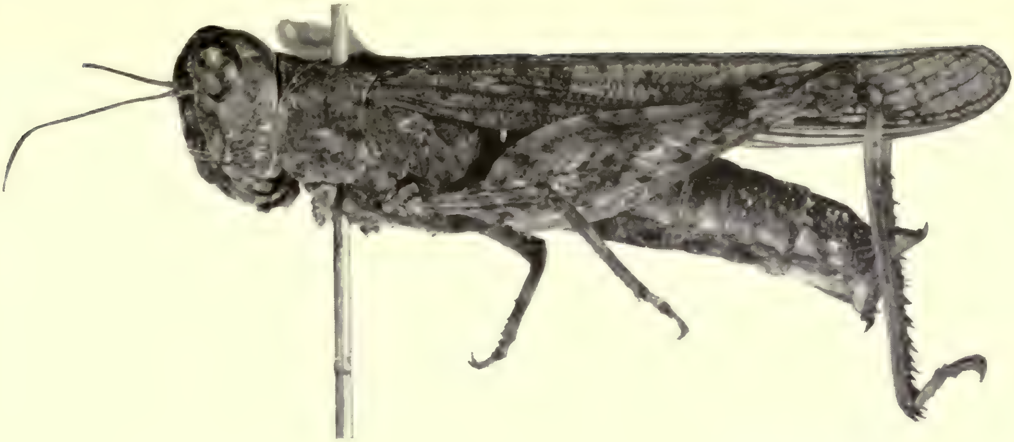
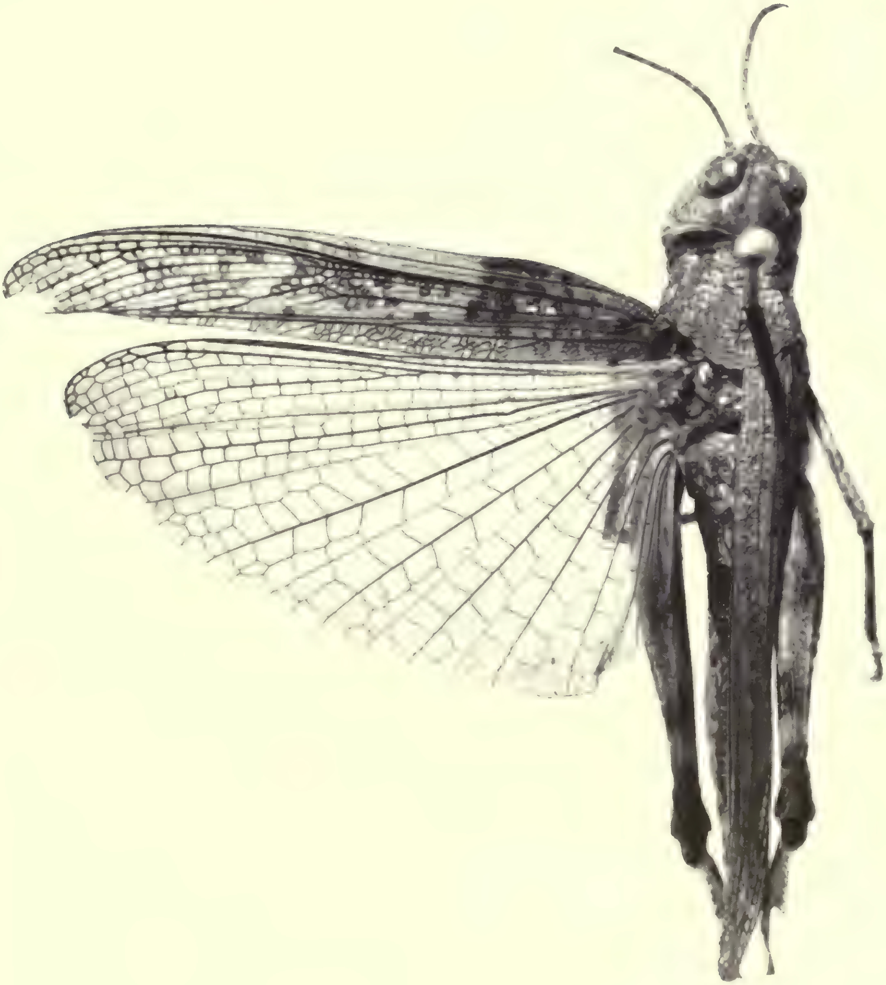


PLATE 7

*Sphingonotus punensis.* Type. Lateral view and from above.

BRITISH MUSEUM
24 JAN 1969
NATURAL HISTORY





# A LIST OF SUPPLEMENTS TO THE ENTOMOLOGICAL SERIES OF THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

1. Masner, L. The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Pp. 143. February, 1965. £5.
2. Nixon, G. E. J. A reclassification of the tribe Microgasterini (Hymenoptera : Braconidae). Pp. 284 ; 348 Text-figures. August, 1965. £6.
3. Watson, A. A revision of the Ethiopian Drepanidae (Lepidoptera). Pp. 177 ; 18 plates, 270 Text-figures. August, 1965. £4 4s.
4. Sands, W. A. A revision of the Termite Subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. Pp. 172 ; 500 Text-figures. October, 1965. £3 5s.
5. Ahmad, I. The Leptocorisinae (Heteroptera : Alydidae) of the World. Pp. 156 475 Text-figures. November, 1965. £2 15s.
6. Okada, T. Diptera from Nepal. Cryptochaetidae, Diastatidae & Drosophilidae. Pp. 129 ; 328 Text-figures. May, 1966. £3.
7. Giliomee, J. H. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera : Coccoidea). Pp. 168 ; 43 Text-figures. February, 1967. £3 3s.
8. Fletcher, D. S. A revision of the Ethiopian species and a check list of the world species of *Cleora* (Lepidoptera : Geometridae). Pp. 119; 14 plates, 146 Text-figures, 9 maps. February, 1967. £3 10s.
9. Hemming, A. F. The Generic Names of the Butterflies and their type-species (Lepidoptera : Rhopalocera). Pp. 509. August 1967. £8 10s.
10. Stempffer, H. The Genera of the African Lycaenidae (Lepidoptera : Rhopalocera). Pp. 322; 233 Text-figures. Coloured frontispiece. September 1967. £8.
11. Mound, L. A. A review of R. S. Bagnall's Thysanoptera Collections. Pp. 184; 82 Text-figures. May, 1968. £4.
12. Watson, A. The Taxonomy of the Drepaninae represented in China, with an Account of their World Distribution (Lepidoptera : Drepanidae). Pp. 151: 293 Text-figures, 14 plates. November, 1968. £5.

PRINTED IN GREAT BRITAIN BY ADLARD & SON LIMITED, BARTHOLOMEW PRESS, DORKING

BRITISH MUSEUM
24 JAN 1969
NATURAL HISTORY

# DIPTERA FROM NEPAL

---

# SPHAEROCERIDAE

J. C. DEEMING

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 3
LONDON : 1969

# DIPTERA FROM NEPAL

# SPHAEROCERIDAE

BRITISH MUSEUM
24 JAN 1969
NATURAL HISTORY

BY

J. C. DEEMING

Institute for Agricultural Research, Samaru, P.M.B. 1044 Zaria, Nigeria

*Pp.* 53–74 ; 32 *Text-figures*

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 3
LONDON : 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In* 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Vol.* 23, *No.* 3 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

*World List* abbreviation:
*Bull. Br. Mus. nat. Hist.* (Ent.).

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued* 28 *January*, 1969 *Price Ten Shillings*

# DIPTERA FROM NEPAL
# SPHAEROCERIDAE

*By* J. C. DEEMING

## CONTENTS

| | PAGE |
|---|---|
| SYNOPSIS | 55 |
| INTRODUCTION | 55 |
| TAXONOMY | 56 |
| REFERENCES | 73 |
| INDEX | 74 |

## SYNOPSIS

The Sphaeroceridae collected on the 1954 and 1961–62 British Museum Expeditions to Nepal are systematically treated along with specimens collected in neighbouring countries. Of the thirty-eight species collected, nine new species are described.

## INTRODUCTION

THIS paper is based mainly on material collected by Mr. R. L. Coe, entomologist on the 1961–62 British Museum (Natural History) Expedition to Eastern Nepal, from localities in the Taplejung District and Arun Valley. Also included are a few specimens collected by Mr. J. Quinlan in Western Nepal during 1954, by Mr. E. Brunetti at Darjeeling during 1913 and single specimens from Assam collected by Mr. R. Senior-White and Mr. C. B. Antram. All type material is in the British Museum (Natural History).

Very little has been written on the Sphaeroceridae of the Himalayas. Brunetti (1913 : 173–4) described *Limosina magna* from Kalek on the north-east frontier of India and *Limosina subtinctipennis* (now *Leptocera* (*Rachispoda*) *subtinctipennis* (Brun.)) from Assam. He later (1924 : 103) described *Limosina notatipennis* and *Limosina tenebrosa* and recorded *Limosina ornata* de Meijere (=*Leptocera* (*Poecilosomella*) *borboroides* (Walker)) from the Siju Cave, Garo Hills, Assam. *Limosina* Macquart *sensu* Brunetti must be regarded as synonymous with *Leptocera* Olivier *sensu lato*. The original descriptions of *Limosina magna*, *notatipennis* and *tenebrosa* are inadequate for the placing of these species in subgenera, and I have unfortunately been unable to examine the types in the Indian Museum, Calcutta. Richards (1962*b*) recorded nineteen species of Sphaeroceridae from Afghanistan, eighteen of which are found in Europe and one possibly new. Hackman (1965 : 37–38) described *Copromyza* (*Crumomyia*) *deemingi* from Sikkim. The mediterranean species *Leptocera* (*Coproica*) *digitata* (Duda) has been recorded from Turkestan, and I have seen specimens from Kirgiziya and Kazakhastan, but it is not represented in the Nepalese material.

My thanks are due to the late Mr. R. L. Coe for making his material available to me, to Prof. O. W. Richards of Imperial College of Science and Technology, London

and Messrs. H. Oldroyd, K. G. V. Smith and A. C. Pont of the British Museum (Natural History) (BMNH) for their kind help and advice, and to the Director, Institute for Agricultural Research, Samaru, Nigeria for allowing me the facilities to complete this paper.

## TAXONOMY

### ***Sphaerocera* (*Lotobia*) *pallidiventris*** (Meigen)

*Borborus pallidiventris* Meigen, 1830 : 204.

W. NEPAL: Ulleri, 6,000–7,000 ft., 1 ♂, 19.v.1954 (*J. Quinlan*).

Widespread in Europe and Africa. Richards (1962*b* : 177) recorded a specimen collected at an altitude of 1,320 m in Afghanistan. There are specimens in BMNH from Kirgiziya, Kazakhastan and Assam.

### ***Copromyza* (*Borborillus*) *marginatis*** (Adams)

*Borborus marginatis* Adams, 1905 : 198.

E. NEPAL: Taplejung Distr., Dobhan, *c.* 3,500 ft., shady places on shrubby slope above R. Tamur, 1 ♂, 8 ♀, 21–27.i.1962 (*R. L. Coe*).

Recorded from the Atlantic Islands, Africa, Madagascar, India, Philippines and Palau Is.

### ***Leptocera* (*Leptocera*) *curvinervis*** (Stenhammar)

*Limosina curvinervis* Stenhammar, 1853 : 406.

A very long series of both sexes was collected by Mr. J. Quinlan at Ulleri in Western Nepal and a similar series by Mr. R. L. Coe from various localities in Eastern Nepal. It would be pointless to list all the locality-data as the species is so common and widespread, having been recorded from Europe, the Atlantic Islands, Africa, Madagascar, Seychelles, Ceylon, India, Formosa, Java, New Guinea, Micronesia and Samoa. I have seen a single specimen from Australia and a long series from Sikkim.

### ***Leptocera* (*L.*) *nigrolimbata*** (Duda)

*Paracollinella nigrolimbata* Duda, 1925 : 60.

E. NEPAL: Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed plants by damp cliff in deep river gorge, 1 ♂, i–ii.1962; Taplejung Distr., edge of mixed forest above Sangu, *c.* 6,500 ft., 1 ♂, 17.x.–1.xi.1961; Taplejung Distr., damp evergreen oak forest above Sangu, *c.* 9,200 ft., 1 ♀, 2–26.xi.1961; Taplejung Distr., Sangu, *c.* 6,200 ft., mixed vegetation by stream in gully, 1 ♂, 3 ♀, xi.1961–i.1962; Taplejung Distr., Sangu, *c.* 6,200 ft., mixed vegetation in deep gully, 1 ♀, 2.i.–13.ii.1962; Taplejung Distr., Dobhan, E. bank of R. Tamur, *c.* 3,500 ft., mixed vegetation by stream in deep gully, 1 ♂, i–ii.1962 (*R. L. Coe*).

INDIA: Darjeeling, 5 ♂, 4 ♀, 13–18.ix.1913 (*E. Brunetti*).

Described from Formosa.

### ***Leptocera* (*L.*) *paranigrolimbata*** (Duda)

*Paracollinella paranigrolimbata* Duda, 1925 : 61.

INDIA: Darjeeling, ♂, 13–18.ix.1913 (*E. Brunetti*).

Described from Formosa. There are two males in the BMNH from Assam.

### ***Leptocera* (*L.*) ? *koningsbergeri*** (Duda)

*Paracollinella koningsbergeri* Duda, 1925 : 49.

E. NEPAL: Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed shrubs in deep gorge, 1 ♂, x–xi.1961 (*R. L. Coe*).

This specimen agrees well with the original description, but has a faint infuscate band across the middle of the wing. Described from Sumatra and W. Java. The " Buitenzon " given by Duda as a type locality is a misspelling of Buitenzorg, now named Bogor.

### ***Leptocera* (*Rachispoda*) *subtinctipennis*** (Brunetti)

*Limosina subtinctipennis* Brunetti, 1913 : 174.

E. NEPAL: Taplejung Distr., Sangu, *c.* 6,200 ft., mixed vegetation by stream in gully, 1 ♂, xi.1961–i.1962; same locality, evergreen scrub, 1 ♂, 5–13.x.1961; Arun Valley, below Tumlingtar, River Sabhaya, west shore, *c.* 1800 ft., dead leaves lying on sandy shore, 1 ♀, 22.xii.1961 (*R. L. Coe*).

A common species distributed across the tropics of the Old World from West Africa to the Caroline and Solomon Islands.

### ***Leptocera* (*Rachispoda*)** sp. near ***divergens*** (Duda)

E. NEPAL: Taplejung Distr., damp evergreen oak forest above Sangu, *c.* 9,200 ft., 1 ♀, 2–26.xi.1961 (*R. L. Coe*).

The single teneral specimen runs to *Collinella divergens* Duda in Duda's 1925 key, but differs from his description for that species in having a very weakly developed interantennal keel, a strongly projecting mouth margin, and the scapular present only as a very weak hair.

### ***Leptocera* (*Opacifrons*) *pseudimpudica* sp. n.**

(Text-figs. 1, 2)

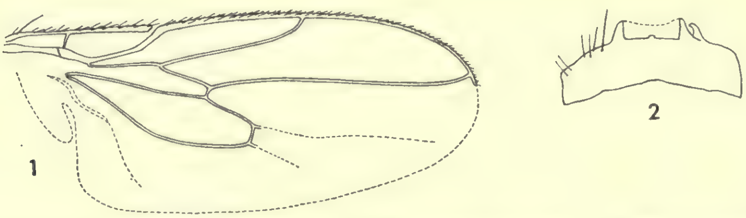
This species agrees almost perfectly with Duda's original description of *Opacifrons impudica*. However, as that species was described from the Andes and has not been recorded from the Pacific, I prefer to regard the two species as separate rather than risk a misidentification.

♂. A small dull black species, heavily whitish dusted, especially on the face and jowls; legs dirty yellow, but femora, tibiae and fore tarsus noticeably infuscated; halteres dirty yellow; wings whitish hyaline with light brown veins. Head deeper than long; jowls one-quarter of height of eye; face moderately produced between the antennae, which between their bases form an angle of 100°; arista long-haired, nearly four times as long as remainder of antenna, of which the third segment is noticeably long-haired; four pairs of fine interfrontal bristles; postvertical bristle as long as ocellar; all head-bristles long; frontal triangle less heavily dusted than remainder of frons. Dorsum of thorax less heavily dusted than head, with two pairs of strong dorsocentral bristles and six rows of interdorsocentral setulae between the more anterior pair; a pair of prescutellar acrostical hairs enlarged; scutellum long, with the usual two pairs of bristles, the shorter anterior pair as long as scutellum and apical pair as long as dorsum of thorax; fore femur with a row of weak posterodorsal and posteroventral hairs; fore tarsus long, the segments becoming progressively more flattened towards the apex; mid tibia with a short anterodorsal bristle at 0·7 of its length, a medium one at 0·23 and a long one at 0·82, a medium posterodorsal at 0·7, no apical ventral, and the apical two-thirds of its ventral surface set with minute stout bristles; ventral bristle of mid basitarsus longer than the basitarsus is wide; hind leg normal. Wing (Text-fig. 1) longer than abdomen; second costal sector shorter than third; costa overpassing the slightly sinuate third vein; fold of fourth vein extending to wing-margin; fifth vein weakly produced beyond discal cell; alula narrow. Abdomen with only weak pale hairs; pregenital sternite (Text-fig. 2) with two widely-separated thumb-like projections and an inwardly-directed hook-like projection on the posterior margin; claspers strap-like, weakly infuscated; posterior gonapophysis long, pointed and downwardly-directed. Length 1·6 mm.

♀ resembling ♂, but mid tibia lacking the numerous short stout bristles ventrally; last tergite strongly shining; cercus with pale upwardly-directed sharp apical tooth.

Holotype ♂. E. NEPAL: Taplejung Distr., river banks below Tamrang Bridge, *c.* 5,500 ft., x–xi.1961 (*R. L. Coe*).

Paratypes. 2 ♂, 4 ♀, same data; Taplejung Distr., above Sangu, *c.* 6,500 ft., evergreen scrub, 2 ♂, 5–13.x.1961; Taplejung Distr., Sangu, *c.* 6,200 ft., mixed vegetation by stream in gully, 2 ♂, ix–x.1961; Taplejung Distr., edge of mixed forest above Sangu, *c.* 6,500 ft., 1 ♀, 17.x.–1.xi.1961 (*R. L. Coe*).



FIGS. 1–2. *Leptocera* (*Opacifrons*) *pseudimpudica* sp. n. 1, right wing; 2, ♂ pregenital sternite.

## KEY TO MALES OF SPECIES OF *Leptocera* (*Poecilosomella*) RECORDED FROM THE HIMALAYAS

1 Hairs on arista very long; costal hairs long and fine; second costal sector short; wing brownish with pale markings on the crossveins **borboroides** (Walker) (widespread in Asia)

– Hairs on arista short; costal hairs minute, but if long on first sector, then robust; wing pattern variable . . . . . . . . . . . . . . 2

2 Second vein bearing a distinct preapical stump-vein . . . . . . . 3

– Second vein lacking a stump-vein . . . . . . . . . 4

3 Long anterior bristle on mid tibia equidistant between the two long anterodorsals **annulitibia** sp. n. (Nepal)
– Long anterior bristle on mid tibia situated much nearer to the more basal of the two long anterodorsals than to the more apical . . **nepalensis** sp. n. (Nepal, India)
4 Apical ventral bristle on mid tibia very long, half as long as basitarsus . . . . 5
– Apical ventral bristle on mid tibia shorter, sometimes absent . . . . . 6
5 Genitalia as in Text-fig. 19 . . . . . . . **brunettii** sp. n. (India)
– Genitalia as in Text-fig. 20 . . . . sp. near **brunettii** Deeming (India)
6 Fore tarsus predominantly vivid white . . . . **aciculata** sp. n. (Nepal)
– No segment of fore tarsus white, though some may be dirty yellow . . . . 7
7 Ventral surface of mid tibia long-haired . . . . . . . . . . 8
– Ventral surface of mid tibia short-haired . . . . . . . . . . 9
8 Reddish brown species; apical ventral bristle of mid tibia present though small **punctipennis** (Wiedemann) (widespread through Asia to Polynesia)
– Blackish brown species; apical ventral bristle of mid tibia absent **himalayensis** sp. n. (Nepal)
9 Second and third costal sectors equal, or nearly so **varians** Duda (widespread in Asia)
– Second costal sector much longer than the third **longinervis** Duda (India, Burma, Nepal, China and Formosa)

### ***Leptocera* (*Poecilosomella*) *punctipennis*** (Wiedemann)

*Borborus punctipennis* Wiedemann, 1824 : 559.

E. Nepal: Arun Valley, below Tumlingtar, River Sabhaya, west shore, *c.* 1,800 ft., human excreta in sandy place, 3 ♂, 1 ♀, 9–22.xii.1961 (*R. L. Coe*).

A very common species, recorded from the Belgian Congo, Asia, Micronesia and Polynesia. There are specimens from Queensland, Australia, in BMNH. Brunetti collected very long series of this species at Darjeeling, Lucknow and Calcutta.

### ***Leptocera* (*Poecilosomella*) *varians*** Duda

(Text-figs. 8, 14, 21)

*Poecilosomella varians* Duda, 1925 : 99.

E. Nepal: Arun Valley, east shore of R. Arun below Tumlingtar, *c.* 1,800 ft., evergreen shrubs bordering dry stream beds, 1 ♂, 14–23.xii.1961; Arun Valley, below Tumlingtar, River Sabhaya, west shore, *c.* 1,800 ft., human excreta in sandy place, 1 ♀, 9–22.xii.1961 (*R. L. Coe*).

Described from Singapore and Formosa. There are specimens in BMNH from India, Ceylon and Celebes.

### ***Leptocera* (*Poecilosomella*) *longinervis*** Duda

*Poecilosomella longinervis* Duda, 1925 : 103.

E. Nepal: Arun Valley, below Tumlingtar, River Sabhaya, west shore, *c.* 1,800 ft., human excreta in sandy place, 2 ♀, 9–22.xii.1961 (*R. L. Coe*).

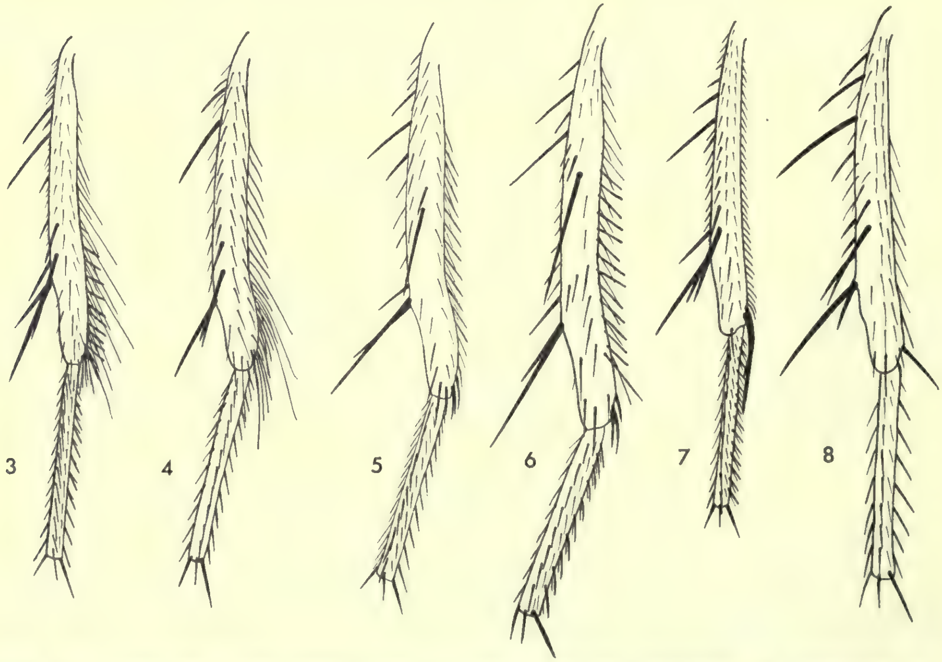
Described from Formosa. There are specimens in BMNH from India, Burma and China. Duda omitted to give any description of the abdomen in his original description, but a useful character for recognition is the very small size of the male genital capsule in comparison with other species of the subgenus.

### *Leptocera* (*Poecilosomella*) *aciculata* sp. n.

(Text-figs. 3, 9, 15)

A species closely resembling *L. pallidimana* Duda, but differing from it in the chaetotaxy of the mid tibia; leg coloration; and the structure of the male genitalia, in which species the clasper has a semi-triangular ploughshare-shaped anterior lobe and a narrow posterior lobe bearing a pale apical tooth.

♂. Ground colour black; jowls and frons anteriorly and antenna basally dirty orange; pleural sutures yellow; haltere black with a yellow stem; all tibiae basally and apically narrowly yellow, the hind tibia distinctly and the mid tibia indistinctly with a yellow band centrally; basal half of fore tarsus infuscated, otherwise tarsus vivid white; mid tarsus entirely yellow; hind basitarsus and next segment black, both narrowly white apically, the next two segments yellowish white, the last black. Wing yellowish, with a white mark halfway along the first vein extending downwards into the discal cell, another connecting the crossveins and a third along the centre of the last section of the third vein; dark markings on the extreme wing base, the humeral vein, from the apex of first vein to junction of second and third veins, on apex of second vein, and also, though barely visible, on base and apex of ultimate section of third vein. Lightly dusted with heavier, silvery dusting in patches. Head deeper than long; 4–5 pairs almost equally-developed interfrontal bristles; the posterior of the two orbital bristles the longer; internal and external vertical bristles subequal; one pair of strong postverticals; frons strongly silver-dusted on a median line, around ocelli, at bases of all bristles, on jowls, first antennal



FIGS. 3–8. *Leptocera* (*Poecilosomella*) spp., ♂ right tibia and basitarsus. 3, *aciculata* sp. n.; 4, *himalayensis* sp. n.; 5, *annulitibia* sp. n.; 6, *nepalensis* sp. n.; 7, *brunettii* sp. n.; 8, *varians* Duda.

segment and at either side of base of antenna; interantennal prominence weakly developed; vibrissa as long as an antenna; jowls three-sevenths of height of eye; third antennal segment one and two-thirds times as long as second, rather pointed, with dense pilosity; arista two and one-third times as long as remainder of antenna and with hairs of medium length. Thorax with chaetotaxy typical of the subgenus; 8–10 rows of interdorsocentral setulae anteriorly; a single pair of prescutellar acrostical hairs enlarged; scutellum as broad as long, rounded apically; fore coxa strongly haired; fore femur with a few posterodorsal bristles at 0·7 of its length and with a row of long straight posteroventral hairs along its whole length; fore tibia rather densely haired; mid femur not as strongly swollen as fore or hind, with one long erect anteroventral bristle at extreme bare; mid tibia (Text-fig. 3) with a long anterior bristle at 0·6 of its length and a shorter one at 0·52, a long anterodorsal at 0·28 and another still longer at 0·72, this last surmounted by a smaller at 0·64, a posterodorsal paired with and shorter than most apical anterodorsal, a shorter posterodorsal at 0·32 and another still shorter at 0·56, ventrally on apical half with long hairs, and amongst these on apical third are shorter, stouter and more erect hairs; mid basitarsus half as long as tibia and one and one-third times as long as second segment; hind femur strongly swollen, with a long erect basal ventral hair. Wing (Text-fig. 9) with second vein lacking a stump-vein and strongly upcurved to costa, though not quite at right angles to it; third vein strongly and evenly curved forward, ending a little further in front of wing-tip than fold of fourth vein ends behind it, and slightly overpassed by costa; second section of fourth vein slightly longer than posterior crossvein and only two-thirds times as long as second section of third vein; second costal sector slightly longer than third; alula normal. Abdomen with long lateral marginal bristles on tergites; genital capsule (Text-fig. 15) with numerous rather sinuate hairs, especially ventrally; clasper posteriorly near base with numerous downwardly-directed fine hairs, the anterior lobe sickle-shaped, the posterior squat and bearing a short black curved apical tooth; the slightly asymmetrical pregenital sternite half as wide as abdomen, with a small median apical keel bearing minute dense pile. Length 2·5 mm.

♀ unknown.

Holotype ♂. E. NEPAL: Taplejung Distr., Sangu, *c.* 6,200 ft., mixed vegetation by stream in gully, ix–x.1961 (*R. L. Coe*).

Paratypes. Same locality, rotting fruits of bhor tree on ground, 1 ♂, 7–31.x.1961; Taplejung Distr., Dobhan, *c.* 3,500 ft., small pockets of plants on arid slopes above R. Maewa, 1 ♂, 2.i.1962 (*R. L. Coe*).

### ***Leptocera* (*Poecilosomella*) *himalayensis*** **sp. n.**

(Text-figs. 4, 11, 16)

Similar to the preceding species (*L. aciculata*) but differing from it in the chaetotaxy of the mid tibia, leg coloration, wing markings and the structure of the male genitalia.

♂. Brownish black, paler on antenna, face, frons and pleural sutures, and with dusting typical of the subgenus; all tibiae yellowish on a narrow basal, broad central and broad apical band; tarsi yellowish, with apical segment infuscated, the bases of all basitarsi and the second segment of hind tarsus infuscated. Wing (Text-fig. 11) yellowish with yellow veins; a white mark covering and connecting crossveins; dark marks at base, junction of second and third veins, and apices of first, second and third veins. Haltere yellow. Head deeper than long with semi-oblique eye; jowls two-sevenths times height of eye; four pairs of weak interfrontal bristles; the posterior of the two orbital bristles slightly the longer; internal vertical bristle longer than external and as long as ocellar; postocular hair adjacent to external vertical well developed; vibrissa long, with only weak hairs behind it; arista two and a half times as long as remainder of antenna, and with hairs of moderate length. Thorax with chaetotaxy and dusting as in preceding species; mid femur with a row of five weak anterior bristles on apical half, preapically with a distinct anterior bristle; mid tibia (Text-fig. 4) with a long anterior bristle at 0·7 of its length surmounted by a bristle half as long, a long anterodorsal at 0·8 and a shorter one at 0·32, this last surmounted by a bristle of half its length, a shorter posterodorsal paired with the most apical anterodorsal and two short posterodorsal bristles at 0·4 and 0·6; apical part ventrally with long fine hairs, lacking a stronger apical ventral bristle. Wing (Text-fig. 11) with second and third costal sectors equal; costa slightly overpassing apex of third vein; last developed section of fourth vein equal to length of posterior crossvein; fourth vein reaching wing-margin as a fold. Abdomen with fine hairs; a long hair on lateral margins of fourth and fifth tergites; genital capsule (Text-fig. 16) with numerous fine hairs; posterior lobe of clasper bearing a droplet-shaped apical tooth; posterior gonapophysis broad. Length about 2·7 mm.

♀ resembling ♂, but mid tibia lacking the long fine hairing ventrally and armed with an apical ventral bristle that is longer than width of tibia; cercus rounded apically, densely covered in short pile and bearing a few long fine rather sinuate hairs.

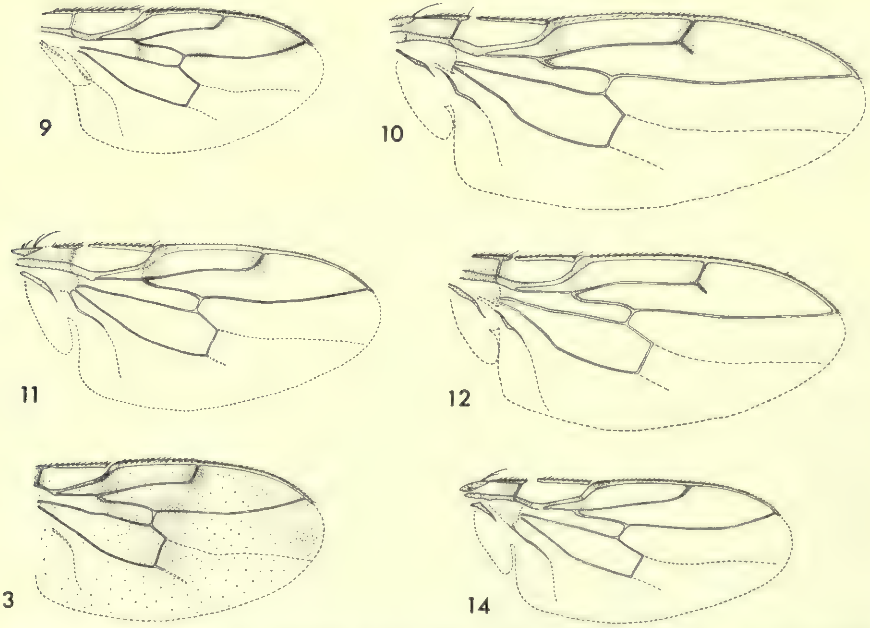
Holotype ♂. E. NEPAL: Taplejung Distr., river banks below Tamrang Bridge, *c*. 5,500 ft., x–xi.1961 (*R. L. Coe*).

Paratypes. 1 ♂, 1 ♀, same data.

## ***Leptocera* (*Poecilosomella*) *annulitibia* sp. n.**

(Text-figs. 5, 10, 18)

Similar to the preceding species (*L. himalayensis*), but differing from it in leg coloration and chaetotaxy, the presence of a stump-vein on the second wing-vein, the structure of the male genitalia and other minor points.



FIGS. 9–14. *Leptocera* (*Poecilosomella*) spp., right wing. 9, *aciculata* sp. n.; 10, *annulitibia* sp. n.; 11, *himalayensis* sp. n.; 12, *nepalensis* sp. n.; 13, *brunettii* sp. n.; 14, *varians* Duda.

♂. Coloration as in *L. himalayensis*, but fore tibia lacking a central annulus, and the two apical segments of fore and hind tarsi infuscated. Head deeper than long; jowls two-fifths times height of eye; three pairs of weak interfrontal bristles; orbitals equal; verticals equal; arista three times length of remainder of antenna, with hairs of moderate length; fore femur with a row of weak posterodorsal bristles on apical half and a row of weak posteroventrals on apical quarter, ventrally with dense fine hairs that are not as long as femur is wide; fore tibia with similar hairing; mid femur with a strong preapical anterior bristle and a row of four shorter bristles leading up to it, and an apical posterior bristle; mid tibia (Text-fig. 5) with a long anterodorsal bristle at one-quarter and three-quarters of its length, both these bristles surmounted by a much shorter bristle, much shorter posterodorsals paired with the long anterodorsals and several short posterodorsals between them, a long anterior bristle surmounted by a much shorter one intermediate between the long anterodorsals, ventrally on the apical two-thirds with stout erect hairs and with several short apical bristles; hind leg normal. Wing (Text-fig. 10) with a distinct stump-vein preapically on second vein; fourth vein distinctly produced as a fold to wing-margin and ending slightly nearer wing-tip than third vein; fifth vein not reaching wing-margin as a fold; alula normal. Abdomen normal; pregenital sternite (Text-fig. 18) with a narrow and projecting median apical keel bearing dense pile and with two hairs at its base; posterior lobe of clasper bearing a black tooth; posterior gonapophysis broad and pointed. Length about 2·7 mm.

♀ resembling ♂, but frons darker; the long ventral hairing on fore and mid legs lacking; mid tibia with one of the apical ventral bristles, though short, distinctly longer than the others; cercus rounded apically, with a few fine sinuate hairs.

Holotype ♂. E. NEPAL: Taplejung Distr., river banks below Tamrang Bridge, *c.* 5,500 ft., x–xi.1961 (*R. L. Coe*).

Paratypes. 1 ♂, 1 ♀, same data.

### *Leptocera* (*Poecilosomella*) *nepalensis* sp. n.

(Text-figs. 6, 12, 17)

♂. Almost exactly resembling the preceding species (*L. annulitibia*), but differing from it in the following respects: Four pairs of weak interfrontal bristles; the long anterior bristle on mid tibia (Text-fig. 6) situated much closer to the more basal of the two long anterodorsal bristles; wing (Text-fig. 12) slightly broader; pregenital sternite (Text-fig. 17) with a wider median apical keel; apical tooth on posterior lobe of clasper broader, resembling a molar; posterior gonapophysis narrower and rounded apically, and several other small differences in male genitalia. Length about 2·7 mm.

♀ unknown.

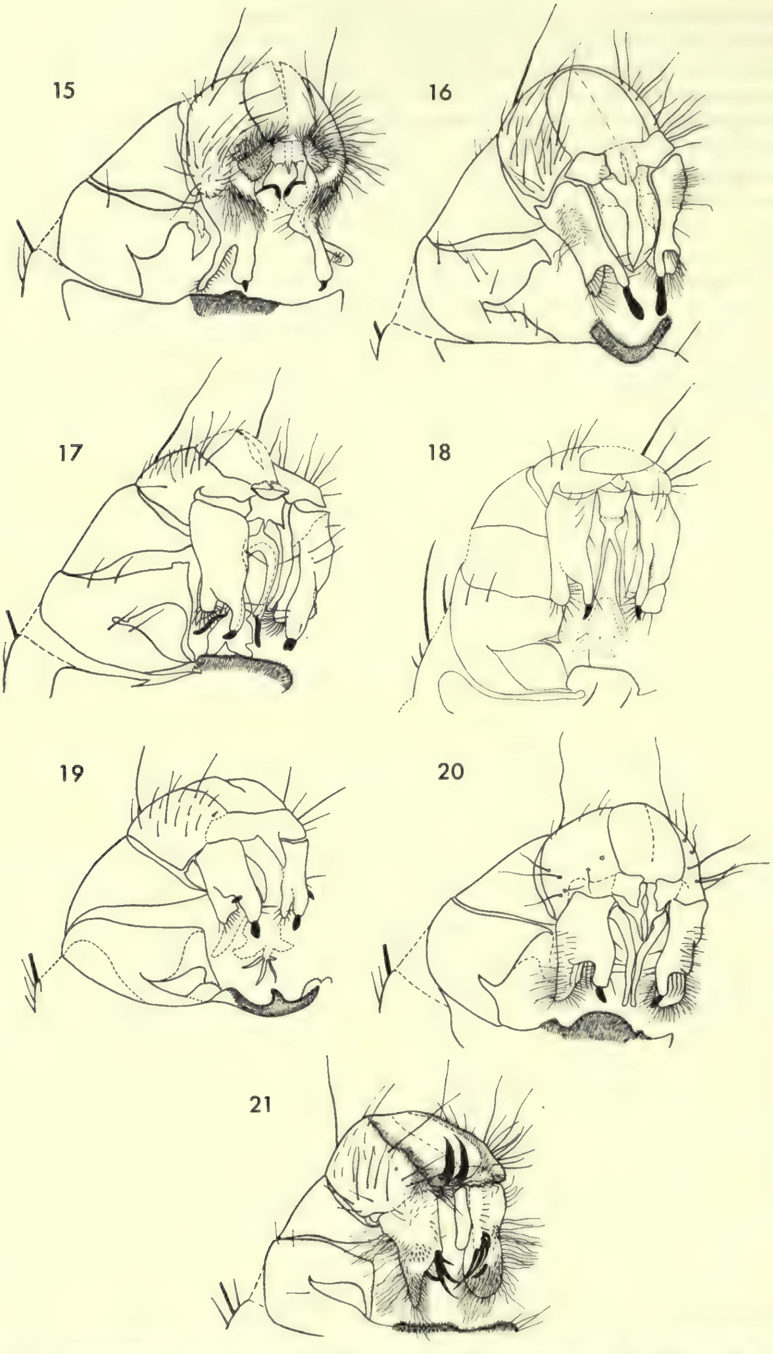
Holotype ♂. E. NEPAL: Taplejung Distr., river banks below Tamrang Bridge, *c.* 5,500 ft., x–xi.1961 (*R. L. Coe*).

Paratypes. 1 ♂, same data; INDIA: Darjeeling, 1 ♂, 13–18.ix.1913 (*E. Brunetti*).

### *Leptocera* (*Poecilosomella*) *brunettii* sp. n.

(Text-figs. 7, 13, 19)

A species more closely resembling *L. furcata* Duda than any other species, but easily distinguishable from it on account of the absence of a stump-vein preapically on the second vein and the presence of a very long apical ventral bristle on the mid tibia.



Figs. 15–21. *Leptocera* (*Poecilosomella*) spp., apex of abdomen. 15, *aciculata* sp. n.; 16, *himalayensis* sp. n.; 17, *nepalensis* sp. n.; 18, *annulitibia* sp. n.; 19, *brunettii* sp. n.; 20, sp. near *brunettii* sp. n.; 21, *varians* Duda.

♂. Ground colour black; jowls, frons anteriorly and antenna dirty yellow; haltere, extreme bases and apices of all tibiae, apices of all basitarsi, the next three segments on fore and mid tarsus, and apex of second segment and all of third and fourth segments of hind tarsus yellow. Wing (Text-fig. 13) yellowish, with rather ill-defined brown markings on humeral crossvein, from apex of first across junction of second and third veins, at apex of second, across centre of wing and at apex; crossveins and section of fourth vein connecting them white. Dusting effect typical of the subgenus; head deeper than long; eye two and one-third times as high as jowls, noticeably emarginate at base of antenna; third antennal segment large, wide and heavily pilose; arista 2·4 times as long as remainder of antenna, with hairs of moderate length; vertical bristles subequal, as long as vibrissa; postvertical bristle as long as inwardly-directed upper postocular; no enlarged setae preceding dorsocentral bristles, ten rows interdorsocentral setulae between the anterior pair; the prescutellar acrosticals enlarged; scutellum broader than long, rather truncate apically; all legs short-haired; mid femur with a row of five anterior bristles on the apical third; mid-tibia (Text-fig. 7) with a long anterior bristle situated at 0·72 of its length and surmounted by a much shorter bristle, a long anterodorsal at 0·33 and another at 0·78, both of these surmounted by a shorter bristle, a rather short posterodorsal at 0·71 and a very short one at 0·4, the apical ventral bristle half as long as the basitarsus and surrounded at its base by several much shorter and weaker bristles. Wing (Text-fig. 13) broad; costa slightly overpassing third vein; second costal sector a little shorter than third; second vein angularly upcurved to costa; third vein strongly curved forwards, ending further in front of wing-tip than fold of fourth vein ends behind; posterior crossvein longer than distance between crossveins; alula rather narrow but rounded apically. Abdomen normal; tergites bearing single apical bristles laterally and a few weak hairs on posterior margins; pregenital sternite (Text-fig. 19) with a pilose median apical keel; posterior lobe of clasper with a black apical tooth and another on external surface; posterior gonapophysis short, broad and apically pointed. Length about 2 mm.

♀ unknown.

Holotype ♂. INDIA: Darjeeling, 13–18.ix.1913 (*E. Brunetti*).

### ***Leptocera* (*Poecilosomella*)** sp. near ***brunettii*** Deeming

(Text-fig. 20)

A single male of an undescribed species very closely resembling the preceding species, having identical wing-markings and the same distinctive chaetotaxy of the mid tibia. However, in this species the second vein is less angularly upcurved to the costa, the second and third costal sectors are equal, and there are differences in the male genitalia (Text-fig. 20), these being the lack of the external tooth on the posterior lobe of the clasper, and the long, thin, sinuous and apically rounded shape of the posterior gonapophysis.

As the specimen is in poor condition it is deemed an insufficient basis for the erection of a new species. A figure of the male genitalia is given to facilitate the separation of the two species.

ASSAM: Shillong, 1 ♂, 16.x.1920 (*R. Senior-White*).

### ***Leptocera* (*Limosina*) *mirabilis*** Collin

*Limosina mirabilis* Collin, 1902 : 19.

E. NEPAL: Taplejung Distr., damp evergreen oak forest above Sangu, *c.* 9,200 ft., 1 ♀, 2–26.xi.1961; Taplejung Distr., above Sangu, *c.* 6,500 ft., swarming on cowdung, 1 ♀, 5.x.1961 (*R. L. Coe*).

Recorded from North America, Europe and New Zealand.

### ***Leptocera* (*Limosina*) *moesta*** Villeneuve

*Limosina* (*Leptocera*) *moesta* Villeneuve, 1917 : 337.

W. NEPAL: Bakhri Kharka, 5,500 ft., 1 ♂, 24.iv.1954 (*J. Quinlan*); E. NEPAL: Taplejung Distr., river banks below Tamrang Bridge, *c.* 5,500 ft., 1 ♂, x–xi.1961 (*R. L. Coe*).

A common European species.

### ***Leptocera* (*Limosina*) *brevicostata*** Duda

*Limosina brevicostata* Duda, 1918 : 183.

E. NEPAL: Taplejung Distr., above Sangu, *c.* 6,500 ft., swarming on cowdung, 1 ♂, 5.x.1961; Taplejung Distr., below Sangu, *c.* 6,000 ft., by stream in shady ravine, 1 ♀, 30.x.1961 (*R. L. Coe*).

Described from Europe, the species is widely distributed in the Old World, its distribution extending as far east as Polynesia. Duda (1925 : 188) described a variety from the Orient and New Guinea under the name of *Scotophilella brevicostata* var. *rufifrons* on the basis of a slight variation in coloration, wing venation and tarsal enlargement. I prefer to regard the species as variable, as specimens that I have seen from Uganda, which agree with var. *rufifrons* in having very swollen hind tarsi, have the venation and coloration of the typical form. Other specimens from entirely different regions have been difficult to place in either one form or the other. A specimen in BMNH from N. Rhodesia was reared in company with *Sepsis lateralis* Wied. from a dead but unparasitized *Nomadacris septemfasciata* Serv. (Acrididae).

### ***Leptocera* (*Limosina*) *lutea*** Richards

*Leptocera* (*Limosina*) *lutea* Richards, 1963*b* : 127.

E. NEPAL: Taplejung Distr., Dobhan, *c.* 3,500 ft., shady places on shrubby slope above River Tamur, 1 ♂, 1 ♀, 21–27.i.1962 (*R. L. Coe*).

Described from W. Caroline Islands. There are specimens in the Zoological Museum, Copenhagen from the Philippines.

### ***Leptocera* (*Limosina*) *rufilabris*** Stenhammar

*Limosina rufilabris* Stenhammar, 1855 : 408.

E. NEPAL: Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed plants by damp cliff in deep river gorge, 2 ♂, i–ii.1962 (*R. L. Coe*).

W. NEPAL: 2 mls. S.W. of Rambrong, 1 ♂, 8,000 ft. (*J. Quinlan*).

A common European species.

### ***Leptocera* (*Limosina*)** sp. near ***rufilabris*** Stenhammar

E. NEPAL: Taplejung Distr., Sangu, *c.* 6,200 ft., mixed vegetation by stream in gully, 1 ♀, xi.1961–i.1962; Taplejung Distr., edge of mixed forest above Sangu, *c.* 6,500 ft., 1 ♀, 17.x–1.xi.1961 (*R. L. Coe*).

Both specimens are slightly larger and longer-winged than typical *rufilabris*, and the legs are more yellowish as in *L. femorina* Richards, but the second costal sector is not as thickened as it is in that species.

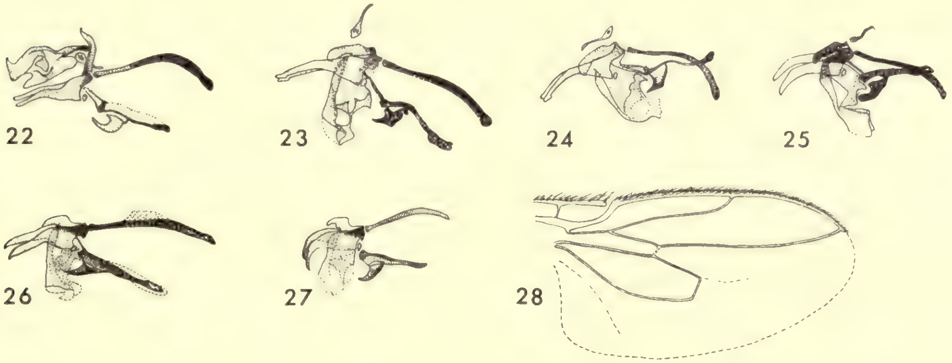
## ***Leptocera* (*Limosina*) *? fucata* Rondani**

(Text-figs. 22 to 27)

*Limosina fucata* Rondani, 1880 : 19.

E. Nepal: Taplejung Distr., below Sangu, *c.* 6,000 ft., by stream in shady ravine, 1 ♂, 30.x.1961 (*R. L. Coe*).

This species exhibits such a diversity of form that I am inclined to regard it as a complex of species. Richards (1952 : 89) described a very closely-related species *Leptocera trichopyga* from Austria, differing from *L. fucata* in wing venation and the chaetotaxy of the mid leg. The Nepalese specimen and specimens from various localities in Europe that I have seen have just such a wing venation as *L. trichopyga*, and between them have a complete range of development of the apical ventral bristle of the mid tibia from that described by Duda for *fucata* (normal) to that described by Richards for *trichopyga* (absent). However, all these specimens lack the enlarged mid basitarsal bristle present in *trichopyga*. Examination of the claspers and internal genitalia of the Nepalese male and comparison with those of the European specimens and an uncertainly-identified *L. fucata* (Coe, 1962 : 118) from Macedonia leads one to no definite conclusion as to its identity or the relationship between the European specimens examined. A great deal more material will have to be examined before it can be decided whether *L. fucata* is merely a very variable species or whether there are other species commonly confused with it. *L. fucata* was described from Europe, has been redescribed with wing-figures by Duda (1918 : 148, fig. 42 and 1938 : 123, fig. 39), and a short redescription is given by Collin (1956 :



Figs. 22–28. *Leptocera* (*Limosina*) spp. 22–27, ?*fucata* Rond., ♂ internal genitalia. 22, Nepal, Taplejung Distr.; 23, Germany (Göttingen); 24, Germany (Teutoburger Wald); 25, Austria (Ötz); 26, Italy (Dolomites); 27, Jugoslavia (Otesevo). 28, *coei* sp. n., right wing.

173) in recording the species from Britain under the synonym *Limosina verticella* Stenhammar.

### ***Leptocera* (*Limosina*) *? fungicola*** Haliday

*Limosina fungicola* Haliday, 1836 : 330.

E. Nepal: Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed plants by damp cliff in deep river gorge, 1 ♂, i–ii.1962 (*R. L. Coe*).

This specimen has a median apical keel on the pregenital sternite, but agrees in all other respects with *L. fungicola*.

### ***Leptocera* (*Limosina*)** sp. (1) near ***paraminima*** (Duda)

E. Nepal: Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed shrubs in deep gorge, 1 ♂, x–xi.1961; Taplejung Distr., river banks below Tamrang Bridge, *c.* 5,500 ft., 2 ♂, x–xi.1961; Taplejung Distr., Dobhan, *c.* 3,500 ft., spray-splashed rocks in River Maewa, 1 ♂, 25.i.1962 (*R. L. Coe*).

This species runs to *Scotophilella paraminima* Duda in Duda's 1925 key, but differs from it in that the second section of the fourth vein is over twice as long as the posterior crossvein. As the description, based on a single female, is scanty and too inadequate for comparison, the species is left undescribed.

### ***Leptocera* (*Limosina*)** sp. (2) near ***paraminima*** (Duda)

E. Nepal: Taplejung Distr., Sangu, *c.* 6,200 ft., mixed vegetation by stream in gully, 1 ♂, xi.1961–i.1962 (*R. L. Coe*).

This species differs from the preceding in the presence of a large and rounded median apical keel on the pregenital sternite in the male. A single female labelled Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed plants by damp cliff in deep river gorge, i–ii.1962 may belong to either this or the preceding species.

### ***Leptocera* (*Limosina*)** sp. (1) near ***schmitzi*** (Duda)

E. Nepal: Taplejung Distr., Sangu, *c.* 6,200 ft., mixed vegetation by stream in gully, 1 ♂, xi.1961–i.1962 (*R. L. Coe*).

Superficially almost exactly resembling *L. schmitzi*, but differing from it in having a well developed median apical keel on the pregenital sternite, a smaller genital capsule and less quadrate claspers.

### ***Leptocera* (*Limosina*)** sp. (2) near ***schmitzi*** (Duda)

E. Nepal: Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed plants by damp cliff in deep river gorge, 1 ♂, 1 ♀, i–ii.1962 (*R. L. Coe*).

Similar to the preceding species, but differing from it and *L. schmitzi* in the dirty yellow coloration of the fore coxa. In the female the second costal sector is slightly shorter.

### ***Leptocera* (*Limosina*)** sp. near ***boliviensis*** (Duda)

E. NEPAL: Taplejung Distr., between Sangu and Tamrang, *c.* 5,500 ft., mixed vegetation by stream in deep gully, 1 ♂, i–ii.1962 (*R. L. Coe*).

Differs from *L. boliviensis* in the wing being narrower, the second costal sector longer and in other respects. All legs are bright yellow, only the mid and hind femora being somewhat infuscated; fore coxa with a pair of short stout bristles on inner surface near base; pregenital sternite very long and with a distinct median apical keel.

### ***Leptocera* (*Limosina*)** sp. near ***penetralis*** Collin

E. NEPAL: Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed plants by damp cliff in deep river gorge, 1 ♀, i–ii.1962 (*R. L. Coe*).

Differs from *L. penetralis* in that the apical section of the third vein, though straight, ends nearly as far in front of the wing-tip as the fold of the fourth vein ends behind it.

### ***Leptocera* (*Limosina*) *coei* sp. nov.**

(Text-fig. 28)

A species that runs to *L. chilenica* Duda (couplet 43) in Duda's 1925 key, but easily distinguishable from it on account of its single pair of dorsocentral bristles.

♂. Ground colour dark brown; head, with exception of occiput, upper orbits, clypeus, palpus and proboscis golden orange; bases of meso- and pteropleuron, whole of metapleuron, haltere, trochanters, extreme bases and apices of all tibiae, and all tarsi yellow; wing yellowish hyaline with yellow veins. Head deeper than long, lightly dusted; frons strongly convex; interantennal keel strongly pronounced; jowls one-quarter height of eye; an upwardly-directed bristle behind the vibrissa and half its length; four pairs of strong interfrontal bristles; ocellar bristle long, as long as internal vertical; external vertical shorter; the orbitals hardly longer than the postvertical; third antennal segment large, rather pointed and densely pilose; arista rather long-haired, two and a half times as long as remainder of antenna. Disc of thorax densely grey-dusted, uniformly covered with dense short setulae; a single pair of fine dorsocentral bristles that reach slightly beyond tip of the semicircular scutellum and a slightly enlarged seta situated just in front of each; fore femur rather swollen, with a row of four fine posterodorsal bristles on the apical two-thirds and similar posteroventrals on apical third; mid femur with a strong preapical anterodorsal bristle; mid tibia with a short anteroventral bristle at 0·55 of its length, progressively longer anterodorsals at 0·27, 0·45 and 0·8, a dorsal as long as this last bristle at 0·75, longer posterodorsals at 0·35 and 0·8 with shorter bristles between them at 0·5 and 0·7, and an apical ventral that is two-fifths the length of basitarsus; hind leg normal. Wing (Text-fig. 28) broad; costa rather densely short haired; interspersed amongst the reclinate hairs on second and third costal sectors are fine short hairs projecting at right angles to costa[1]; second and third costal sectors equal; third vein uniformly curved forwards, not overpassed by costa, and ending well in front of wing-tip; fold of fourth vein not produced to wing-margin, strongly curved forwards; outer angles of discal cell rounded, especially the posterior; alula small and narrow. Abdomen less strongly dusted than disc of thorax, with numerous short hairs and weak marginal bristles on the tergites; genital capsule hemispherical and densely short haired; clasper with dense sinuate hairs, band-shaped, slightly swollen apically and bearing an incurved black pointed tooth; posterior gonapophysis curved and pointed; pregenital sternite simple. Length about 1·7 mm.

---

[1] This same character, though seemingly insignificant in this species, may be of value in placing the species in relationship to others as yet undescribed. I have before me an undescribed and obviously closely related species from the Philippines in which these hairs are outstandingly developed and set at an angle to the wing-surface in much the same way as they are in species of the subgenus *Elachisoma* Rondani.

♀ resembling ♂, abdomen broad and flattened; tergites two and four longer than three and five; sternites narrower and broadly separated from the tergites by membrane; cercus weakly sclerotized, with several fine, sinuate hairs.

Holotype ♂. E. NEPAL: Arun Valley, below Tumlingtar, River Sabhaya, west shore, *c.* 1,800 ft., human excreta in sandy place, 9–22.xii.1961 (*R. L. Coe*).

Paratypes 1 ♀, same data; same locality, dead leaves lying in sun on sandy shore, 2 ♂, 22.xii.1961 (*R. L. Coe*); INDIA; Silchar, Cachar, 1 ♂, 3.iii.1911 (*C. B. Antram*).

## *Leptocera* (*Limosina*) *furculisterna* sp. n.

(Text-figs. 29, 30)

A species which, though rather different from *L. vitripennis* Zetterstedt, is probably better likened to it than to any other, on account of the structure of the tergites, which though less strongly differentiated in *vitripennis* are nevertheless differentiated to a noticeable degree. In *vitripennis* the second costal sector is black in contrast to the brown first and third sectors, but in the species described below the costa is uniformly yellow.

♂. A jet-black species, lightly dusted on all but the frontal triangle, the antennal foveolae and a patch anteriorly on the upper sternopleuron; antenna, stem of haltere, fore coxa, all trochanters, basal half of fore femur, extreme bases of mid and hind femora, mid tibia and tarsus, hind tibia with the exception of a broad preapical annulus, last three tarsal segments of hind leg strikingly yellow; last four tarsal segments of fore leg whitish yellow; wing yellowish with yellow veins. Head deeper than long; jowls one-fifth height of eye; ocellar triangle extending to interantennal keel, with three pairs fine hairs; internal vertical bristle longer than the external, the orbitals shorter still, scarcely longer than the postvertical; an upcurved mid jowlar bristle that is nearly half as long as vibrissa; third antennal segment short, long-pilose apically, arista situated preapically, rather long-haired and slightly over three times as long as remainder of antenna; two widely-separated pairs dorsocentral bristles; only four rows of interdorsocentral setulae between anterior pair; scutellum semi-triangular; fore femur slightly swollen, with a few fine anterodorsal and posterodorsal hairs; fore basitarsus very narrow, the remaining four tarsal segments becoming progressively more swollen, the most apical broader than the tibia; mid femur with a few weak anterodorsal hairs; mid tibia with a long posterodorsal bristle at 0·92 of its length, a slightly shorter anterodorsal at 0·33 and a short one at 0·8, this last as long as the apical ventral. Wing (Text-fig. 29) with rather convex fore margin; costa densely short-haired on second and third sectors, overpassing third vein to a distance equal to length of anterior crossvein, and with second sector shorter than third; third vein very strongly bowed, firstly towards and then away from costa; first section of third vein much longer than second, equal to second section of fourth vein; fourth and fifth veins ending slightly beyond discal cell; alula very narrow and pointed. Abdomen (Text-fig. 30) fine-haired; tergite two broad, long and heavily sclerotized, the next three tergites narrower, much shorter, weakly sclerotized and broadly separated by membrane (in dry specimens these tergites crumpled and scarcely recognizable as such), the remaining tergites heavily sclerotized; sternites becoming progressively wider and longer towards the apex, the pregenital broad, laterally long-haired, bearing a short-bristled, square median apical keel that is flanked by an inwardly-curved appendage bearing short bristles apically; clasper large, rather rectangular, the exterior surface and anterior margin clothed with fine hair; posterior gonapophysis short, broad, with a concave posterior margin between two short points. Length about 1·5 mm.

♀ unknown.

Holotype ♂. E. NEPAL: Taplejung Distr., between Sangu and Tamrang, *c.* 5,200 ft., mixed plants by damp cliff in deep river gorge, 1–11.1962 (*R. L. Coe*).

Paratype. Same locality and altitude, mixed shrubs in deep gorge, 1 ♂, x–xi.1961 (*R. L. Coe*).

### ***Leptocera* (*Limosina*)** sp. near ***furculisterna*** Deeming

(Text-fig. 31)

Due to their rubbed condition, no name is given to a pair of specimens of an undescribed species closely resembling *L. furculisterna*, but the characters necessary for distinguishing it from that species are given.

♂. Interantennal keel, extreme anterior margin of frons, and mouth-margin medially yellow; fore coxa black; fore femur with exception of extreme apex black; hind tibia lacking preapical black annulus; all tarsi dirty yellow, the apical segments distinctly infuscated; pregenital sternite (Text-fig. 31) with a double row of bristles bordering the weakly sclerotized median apical keel, lacking the flanking appendages, and with a pair of long bristles near its lateral margins; clasper rectangular, with several rather stout bristles basally on the exterior surface and a pair of minute teeth apically on the posterior margin.

♀ resembling ♂, tergites of the same differentiated structure as the male; cercus with one long sinuate hair and several shorter ones.

E. NEPAL: Arun Valley, below Tumlingtar, River Sabhaya, west shore, *c.* 1,800 ft., dead leaves lying in sun on sandy shore, 1 ♂, 22.xii.1961; Arun Valley, east shore of River Arun below Tumlingtar, *c.* 1,800 ft., evergreen shrubs bordering dry stream beds, 1 ♀, 14–23.xii.1961 (*R. L. Coe*).

### ***Leptocera* (*Limosina*) *monorbiseta* sp. n.**

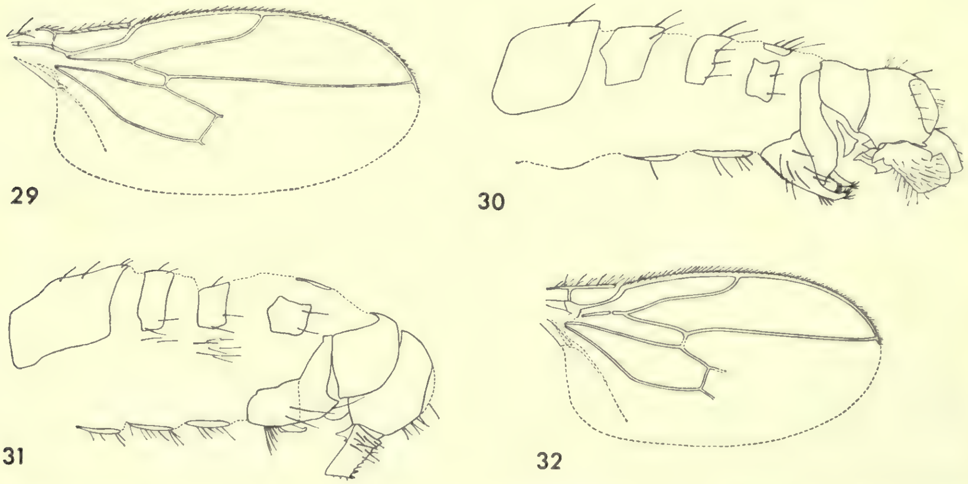
(Text-fig. 32)

A species best likened to *L. mollis* Richards on the basis of the single orbital bristle, but differing from it in the colour of the head and in other respects. Due to the appearance of the antenna, it could be mistaken for a species of the subgenus *Acuminiseta* Duda, but the position of the arista on the third antennal segment places it in *Limosina*.

♀. Ground colour black, lightly dusted; head, with exception of clypeus, proboscis, a triangular patch at base of vibrissa, a fine line extending from base of internal vertical bristle far into the occiput, and apex of third antennal segment, yellow; all trochanters, extreme base and apex of mid tibia, hind tibia with exception of a broad preapical annulus and all tarsi bright yellow; haltere, fore femur, and fore tibia with exception of an indistinct central annulus dirty yellow. Head much deeper than long; frons strongly projecting in front of eye; face retreating beneath; eye five times as high as jowls; three pairs of short weak interfrontal hairs; orbits bearing a single orbital bristle and a row of minute setae; external vertical bristle longer than internal, which is equal to the ocellar; postvertical bristle minute, slightly shorter than the incurved upper postocular; vibrissa long, with a few weak hairs behind; the upwardly-directed buccal bristle short; third antennal segment heavily pilose apically, giving it a pointed appearance although its apex is rounded; arista inserted almost apically, three times as long as remainder of antenna and with hairs of moderate length. Setulae on disc of thorax long and fine, the prescutellar pair no longer than the others; two pairs of long dorsocentral bristles, the more anterior pair the shorter and with eight rows setulae between; scutellum semicircular, the lateral pair marginal bristles scarcely longer than the distance separating them from the apical pair; fore femur with a pair of strong posteroventral bristles preapically; mid femur with a strong preapical anterior bristle; mid tibia with short anterodorsal bristles at 0·27 and 0·68 of its length, similar posterodorsals at 0·37, 0·51 and 0·68, a long dorsal at 0·74 and a long apical ventral; mid basitarsus twice as long as second segment; second segment of hind tarsus strongly swollen, slightly wider than basitarsus; wing (Text-fig. 32) much broader than thorax, with densely haired costa and narrow and pointed alula; second costal sector shorter than third; second vein strongly, third weakly sinuate; basal section of third vein with two breaks, shorter than second section; fourth vein produced beyond discal cell as a rather indistinct fold that does not reach wing-margin; abdomen very flat dorsally, rounded ventrally; first tergite medially unsclerotized; tergites 2–5 short, subequal, becoming progressively narrower; sternites weakly sclerotized and broadly separated from tergites by membrane; cercus with a long sinuate dorsal and apical hair and with several much shorter hairs ventrally. Length about 1·7 mm.

♂ unknown.

Holotype ♀. E. NEPAL: Taplejung Distr., old mixed forest above Sangu, *c.* 6,200 ft., 25–28.x.1961 (*R. L. Coe*).



FIGS. 29–32. *Leptocera* (*Limosina*) spp. 29, *furculisterna* sp. n., right wing; 30, *furculisterna* sp. n., ♂ abdomen; 31, sp. near *furculisterna* sp. n., ♂ abdomen; 32, *monorbiseta* sp. n., right wing.

## ***Leptocera (Trachyopella) obliqua*** Richards

*Leptocera* (*Trachyopella*) *obliqua* Richards, 1963*b* : 129.

E. NEPAL: Taplejung Distr., above Sangu, *c.* 6,500 ft., evergreen scrub, 1 ♂, 5–13.x.1961 (*R. L. Coe*).

Described from the Mariana and Caroline Islands. There are specimens in BMNH from Java, Celebes and Malaya.

### ***Leptocera* (*Coproica*) *hirtula*** Rondani

*Limosina hirtula* Rondani, 1880 : 38.

E. NEPAL: Taplejung Distr., Dobhan, *c.* 3,500 ft., shady places on shrubby slope above River Tamur, 2 ♀, 21–27.i.1962 (*R. L. Coe*).

A common and cosmopolitan species.

## REFERENCES

ADAMS, C. F. 1905. Diptera Africana—I. *Kans. Univ. Sci. Bull.* **3** : 147–208.

BRUNETTI, E. 1913. Zoological Results of the Abor Expedition 1911–12. Diptera. *Rec. Indian Mus.* **8** : 149–190.

—— 1924. Diptera of the Siju Cave, Garo Hills, Assam. I. Tipulidae, Tabanidae, Anthomyidae, Acalyptrate Muscidae and Phoridae. *Rec. Indian Mus.* **26** : 99–106.

COE, R. L. 1962. A further collection of Diptera from Jugoslavia, with localities and notes. II. *Glas. Muz. srp. Zeml.* (B) **18** : 95–136.

COLLIN, J. E. 1902. Four new species of Diptera (Fam. Borboridae) found in Britain. *Entomologist's mon. Mag.* **13** : 55–60.

—— 1925. Diptera (Cyclorrhapha) from Spitzbergen. Results of the Oxford Expedition to Spitzbergen, 1924. *Ann. Mag. nat. Hist.* (9) **16** : 332–337.

—— 1956. Some new British Borboridae (Diptera) *J. Soc. Br. Ent.* **5** : 172–178.

DEEMING, J. C. 1964. A remarkable new species of *Leptocera* from Christmas Island and New Guinea. *Opusc. ent.* **29** : 164–167.

DUDA, O. 1918. Revision der europäischen Arten der Gattung *Limosina* Macquart (Dipteren). *Abh. zool.-bot. Ges. Wien* **10** : 1–240.

—— 1920. Revision der altweltlichen Arten der Gattung *Sphaerocera* Latreille (Dipteren). *Tijdschr. Ent.* **62** : 1–38.

—— 1923. Revision der altweltlichen Arten der Gattung *Borborus* (*Cypsela*) Meigen (Dipteren). *Arch. Naturgesch.* **89** : 35–112.

—— 1925. Die aussereuropäischen Arten der Gattung *Leptocera* Olivier = *Limosina* Macquart (Dipteren) mit Berücksichtigung der europäischen Arten. *Arch. Naturgesch.* **90** (A) (1924): 5–215.

—— 1938. Sphaeroceridae (Cypselidae). *In* LINDNER: *Fliegen palaearkt. Reg.* **57** : 1–182.

HACKMAN, W. 1965. On the genus *Copromyza* Fall. (Dipt., Sphaeroceridae), with special reference to the Finnish species. *Notul. ent.* **45** : 33–46.

—— 1967. Sphaeroceridae (Diptera) from Madagascar. *Notul. ent.* **47** : 25–36.

HALIDAY, A. H. 1836. British Species of the Dipterous Tribe Sphaeroceridae. *Entomological Magazine* **3** : 315–336.

MEIGEN, J. W. 1830. *Systematische Beschreibung der bekannten Europäischen zweiflügeligen Insekten.* **6** : 1–401. Aachen & Hamm.

RICHARDS, O. W. 1930. The British Species of Sphaeroceridae (Borboridae, Diptera). *Proc. zool. Soc. Lond.* **18** : 261–345.

—— 1952. Two new Austrian species of *Leptocera* Oliv. (Dipt. : Sphaeroceridae). *Proc. R. ent. Soc. Lond.* (B) **21** : 89–91.

—— 1962*a*. Species of *Copromyza* allied to *sordida* (Diptera : Sphaeroceridae) with notes on types of African Sphaeroceridae described by C. F. Adams. *J. Kans. ent. Soc.* **35** : 364–368.

—— 1962*b*. Contribution à l'étude de la faune d'Afghanistan. 42. Diptera, Sphaeroceridae. *Entomologist's mon. Mag.* **97** : 177–179.

RICHARDS, O. W. 1963*a*. Sphaerocerid flies from South and Central America in the collection of the California Academy of Sciences (Diptera). *Pan-Pacif. Ent.* **39** : 231–246.

—— 1963*b*. Diptera : Sphaeroceridae (Borboridae). *Insects Micronesia* **14** : 109–134.

RONDANI, C. 1880. Species Italicae ordinis Dipterorum (Muscaria, Rnd.) collectae et observatae. Stirps XXV. Copromyzinae Zett. *Bull. Soc. ent. Ital.* **12** : 3–45.

STENHAMMAR, C. 1853. Copromyzidae Scandinaviae granskade och beskrifne. *K. svenska VetenskAkad. Handl.* **41** : 257–442.

—— 1855. *Copromyzinae Scandinaviae.* Holmiae. 184 pp.

VILLENEUVE, J. 1917. Espèces nouvelles de Diptères de la famille des Cypselidae (Borboridae). *Bull. Soc. ent. Fr.* **18** : 333–338.

WIEDEMANN, C. R. W. 1824. *Analecta Entomologica ex Museo Regio Hafniensi maxime congesta.* (154 Dipter., 3 Hymenopt., 2 Coleop.) Kiliae, (Reg. typogr. Schol.) **4**. 60 pp.

## INDEX

aciculata sp. n., 60
annulitibia sp. n., 62

Borborillus Duda, 56
brevicostata Duda, 66
brunettii sp. n., 63

coei sp. n., 69
Coproica Rond., 72
Copromyza Fall., 56
curvinervis Stenh., 56

fucata Rond., 67
fungicola Hal., 68
furculisterna sp. n., 70

himalayensis sp. n., 61
hirtula Rond., 73

koningsbergeri Duda, 57

Leptocera Oliv., 56
Limosina Macq., 65
longinervis Duda, 59
Lotobia Lioy, 56
lutea Rich., 66

marginatis Adams, 56
mirabilis Coll., 65
moesta Villen., 66
monorbiseta sp. n., 71

nepalensis sp. n., 63
nigrolimbata Duda, 56

obliqua Rich., 72
Opacifrons Duda, 57

pallidiventris Meig., 56
paranigrolimbata Duda, 57
Poecilosomella Duda, key to species, 58
pseudimpudica sp. n., 57
punctipennis Wied., 59

Rachispoda Lioy, 57
rufilabris Stenh., 66

Sphaerocera Latr., 56
subtinctipennis Brun., 57

Trachyopella Duda, 72

varians Duda, 59

BRITISH MUSEUM
24 JAN 1969
NATURAL HISTORY

# A LIST OF SUPPLEMENTS TO THE ENTOMOLOGICAL SERIES OF THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

---

1. Masner, L. The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Pp. 143. February, 1965. £5.
2. Nixon, G. E. J. A reclassification of the tribe Microgasterini (Hymenoptera : Braconidae). Pp. 284 ; 348 Text-figures. August, 1965. £6.
3. Watson, A. A revision of the Ethiopian Drepanidae (Lepidoptera). Pp. 177 ; 18 plates, 270 Text-figures. August, 1965. £4 4*s*.
4. Sands, W. A. A revision of the Termite Subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. Pp. 172 ; 500 Text-figures. October, 1965. £3 5*s*.
5. Ahmad, I. The Leptocorisinae (Heteroptera : Alydidae) of the World. Pp. 156 ; 475 Text-figures. November, 1965. £2 15*s*.
6. Okada, T. Diptera from Nepal. Cryptochaetidae, Diastatidae & Drosophilidae. Pp. 129 ; 328 Text-figures. May, 1966. £3.
7. Giliomee, J. H. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera : Coccoidea). Pp. 168 ; 43 Text-figures. February, 1967. £3 3*s*.
8. Fletcher, D. S. A revision of the Ethiopian species and a check list of the world species of *Cleora* (Lepidoptera : Geometridae). Pp. 119 ; 14 plates, 146 Text-figures, 9 maps. February, 1967. £3 10*s*.
9. Hemming, A. F. The Generic Names of the Butterflies and their type-species (Lepidoptera : Rhopalocera). Pp. 509. August, 1967. £8 10*s*.
10. Stempffer, H. The Genera of the African Lycaenidae (Lepidoptera : Rhopalocera). Pp. 322; 233 Text-figures, coloured frontispiece. August, 1967. £8.
11. Mound, L. A. A review of R. S. Bagnall's Thysanoptera Collections. Pp. 184; 82 Text-figures. May, 1968. £4.
12. Watson, A. The Taxonomy of the Drepaninae represented in China, with an Account of their World Distribution (Lepidoptera : Drepanidae). Pp. 151 : 293 Text-figures, 14 plates. November, 1968. £5.

PRINTED IN GREAT BRITAIN BY ADLARD & SON LIMITED, BARTHOLOMEW PRESS, DORKING

M(. E.

15 A
NATURAL H

# REVISIONAL NOTES ON AFRICAN *CHARAXES* (LEPIDOPTERA: NYMPHALIDAE)

## PART V

V. G. L. van SOMEREN

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 4
LONDON: 1969

# REVISIONAL NOTES ON AFRICAN *CHARAXES* (LEPIDOPTERA: NYMPHALIDAE)
## PART V

BRITISH MUSEUM
15 APR 1969
NATURAL HISTORY

BY

V. G. L. van SOMEREN
P.O. Box 24947, Karen, Kenya

*Pp.* 75–166; 8 *Maps*, 29 *Plates*, 31 *Text-figures*

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 4
LONDON: 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In* 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Vol.* 23, *No.* 4 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

*World List* abbreviation :
*Bull. Br. Mus. nat. Hist.* (Ent.)

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued* 11 *April*, 1969 *Price* £4 10s.

# REVISIONAL NOTES ON AFRICAN *CHARAXES* (LEPIDOPTERA: NYMPHALIDAE)

# PART V

*By* V. G. L. van SOMEREN

## CONTENTS

| | Page |
|---|---|
| Synopsis | 77 |
| 1. Supplementary Notes and Addenda on species previously dealt with | 77 |
| 2. The *Charaxes cedreatis-vetula* Complex and *Charaxes chepalungu*—a new species | 84 |
| Systematic List | 91 |
| 3. *Charaxes virilis* Rothschild, *Ch. kheili* Staudinger, *Ch. northcotti* Rothschild and *Ch. mafuga* sp. n. | 92 |
| Systematic List | 98 |
| 4. The *Charaxes etheocles* Complex | 98 |
| Systematic List | 114 |
| 5. *Charaxes grahamei* sp. n. | 115 |
| 6. *Charaxes contrarius* Weymer and *Charaxes petersi* sp. n. | 119 |
| 7. *Charaxes baileyi* van Someren | 122 |
| Systematic List | 125 |
| 8. *Charaxes viola* Butler and its subspecies and forms | 125 |
| Systematic List | 147 |
| 9. *Charaxes cynthia* Butler | 149 |
| Systematic List | 159 |
| Acknowledgements | 160 |
| References | 165 |
| Index | 165 |

## SYNOPSIS

In this paper three new subspecies and two new forms are described of species already dealt with in previous parts of the Bulletin and four new species, six new subspecies and thirteen new forms are described.

## 1. Supplementary Notes and Addenda on Species previously dealt with

### ***Charaxes acuminatus*** Thurau

(van Someren, 1963 : 211–220)

### ***Charaxes acuminatus obudoensis* ssp. n.**

(Pl. 28, figs. 243, 246)

This distinct race is represented by several specimens of both sexes, collected by Mr. R. G. T. St. Leger on the Obudo Plateau at 5,200 ft. in eastern Nigeria, formerly part of British Cameroons. The discovery of this race extends the range of *Ch. acuminatus* very considerably to the west.

MALE. Fore wing length 46 mm. Apex of wing strongly acuminate, tapering and slightly flattened at end of costa, typical of the species. *Upperside.* Resembles somewhat *Ch. a. cottrelli* of the Mwinilunga area of N.W. Zambia in general appearance, but differs markedly by the restricted and more defined bluish white basal areas of both wings; the distal portions of the wings are a richer orange, with the dark pattern more defined. *Underside.* Generally darker in ground colour, but somewhat variable in rufous brownish tones, with a strong satiny sheen on distal borders; oblique dark line strong.

FEMALE. Fore wing length 53 mm. Apex slightly more attenuated than in the male. *Upperside.* Pattern generally similar. *Underside.* Darker more greyish olive.

Holotype male. E. NIGERIA: Obudo Plateau, 5,200 ft., 12.xii.1963 (*R. G. T. St. Leger*). In B.M. (N.H.).

Allotype female. E. NIGERIA: Obudo Plateau, 25.v.1965 (*R. G. T. St. Leger*). In B.M. (N.H.).

### ***Charaxes druceanus*** Butler

(van Someren, 1963 : 228–240)

### ***Charaxes druceanus tectonis*** Jordan

(Pl. 29, figs. 251, 254)

*Charaxes tectonis* Jordan, 1937: 324. Type male, Cameroon, Maungli.
*Charaxes druceanus tectonis* Jordan; van Someren, 1963 : 230–231.

Originally described as a species, possibly allied to *Charaxes eudoxus* or "*fallax*" Richels = *richelmanni* Rob., *tectonis* was placed by me (1963) as a subspecies of *druceanus*, for reasons stated. Some doubt was expressed as to whether the underside pattern of the unique type could be typical of the race as a whole, in view of the fact that very similar variations had been noted in other subspecies of *druceanus*. This doubt has now been dispelled as a result of the capture of additional specimens on the Obudo Plateau, eastern Nigeria (at one time part of the territory included within the Kamerun, then under German control, subsequently administered by Britain under Mandate).

These specimens were taken by Mr. R. G. T. St. Leger in 1964–65, but all were males, exhibiting a reasonable constancy of underside pattern and agreeing with that of the type, i.e. suppression of the broad silvery discal bars of fore and hind wings, but otherwise conforming to the *druceanus* pattern below and above. Mr. St. Leger supports my view that *tectonis* is a subspecies of *druceanus*.

During a brief visit to Nigeria over the Easter vacation, 1966, a young friend of mine visited the Obudo Plateau in company of Mr. St. Leger, and by the extensive use of baited traps, he was fortunate in securing not only males but also two examples of the hitherto unknown female. These latter exhibit the broad silvery white bars on the underside, characteristic of *druceanus*, thus supplying corroborative evidence that *tectonis* is a race of that species.

FEMALE. Fore wing length 38 mm. *Upperside.* Base of fore wing dark chestnut; black spots in the cell and through the discal line and on the distal portion of the wing as in the male;

the series of spots forming the discal and postdiscal pattern as in the male, but orange-ochreous, the marks in 1a–3 coalescing, those of the postdiscal series rather more rufous; margin with distinct rufous spots, double in 1b. Hind wing pattern generally similar to that of the male, but the basal triangle more blackish brown; the discal band defined on the inner border and almost straight, extending from the costa, where it is 7 mm. wide, gradually decreasing in width to above anal angle, colour orange-ochreous, shaded with rufous on outer border. Black band broad, carrying blue spots in 2–3, double at anal angle; marginal border with well defined orange-ochre contiguous lunules, accentuated by a marginal black line; margin rather serrate below 5; tails longish, upper 7 mm., lower 6 mm., followed by some olive at anal lobe. *Underside.* Fore wing subcostal area and bases of 1b–4 chestnut; the subcostal black marks broadly outlined in silver; sub-basal black marks in 1b–3 strongly black; the discal-postdiscal band whitish, shaded with orange on edges, followed by a series of black lunules of decreasing size from 1b to subapex, slightly accentuated by bluish white; marginal border rufous, with greyish olive rays along veins. Hind wing basal area chestnut, with black lines strongly edged in silvery white, the black angled line crossing 1b–1c to inner fold. Discal band, widest at costa and almost straight along inner edge, tapers to above the anal angle where it crosses the inner fold at right angles; postdiscal chestnut bar widest at 3, fading to ochreous olive to above the anal angle and is distally bordered by a submarginal zone of greyish olive, flushed with rufous scales, the zone outlined in black, the black lines forming a double ocellus at anal lobe. Marginal border orange-tawny, paler between tails, more olive at anal lobe; margin black.

Neallotype female. E. NIGERIA: Obudo Plateau, 5,200 ft., 16.iv.66 (*Stephen Collins*). Another rather damaged female taken in trap, same data, in Coll. J. Brock.

## ***Charaxes pythodoris occidens*** van Someren

*Charaxes pythodoris occidens* van Someren, 1963 : 223.

When I described this subspecies from several males taken in the Central African Republic (French Congo) at Ouesso and Mambili, the female was unknown. It has now been discovered in the Bangui district of the Central African Republic, and I am indebted to Mr. J. Plantrou for a colour photograph of this female.

It is very similar in general appearance to the male, having the same strong blue areas on both wings; the upper blue spots of the discal row larger; the submarginal blue spots in the hind wing more strongly developed. Fore wing length 52 mm. Size larger than the male, but the fore wing less incised on outer border; the hind wing more rounded.

CENTRAL AFRICAN REPUBLIC: Bangui, i.1964 (*P. Quonian*), in Coll. Plantrou.

## ***Charaxes schoutedeni*** Ghesquière

(Pl. 29, fig. 257)

*Charaxes schoutedeni* Ghesquière; van Someren, 1964 : 220.

By an unfortunate oversight I omitted to give a photograph of the unique type of this insect when I dealt with this species in some detail, pointing out that it differed in many important respects from the race of *Charaxes smaragdalis leopoldi* Ghesquière of the southern Congo.

Monsieur Jacques Plantrou has recently sent me photos of *leopoldi* from Brazzaville which he suggests are transitional toward *schoutedeni* and, though exhibiting an extension of the blue in the fore wing toward the base of the cell, nevertheless have the large subapical bluish white spot of the fore wing concave and not convex; moreover, the submarginal blue spots of the hind wing are small, compared with the large spots of *schoutedeni*. Furthermore, the undersides do not agree. Until more specimens of *schoutedeni* are obtained from the type locality its exact status cannot be decided.

### ***Charaxes penricei tanganyikae*** van Someren

*Charaxes penricei tanganyikae* van Someren, 1966 : 67.

### ♀ form ***caerulescens*** **forma n.** (Pl. 29, figs. 255, 256)

Fore wing length 40 mm. *Upperside.* Similar in pattern to the white-barred form of this subspecies, but the hind portion of the broad discal bar and the broad discal band on the hind wing strongly flushed with blue. The fore wing subcostal spots white.

Holotype female. TANZANIA: Kigoma district, Mihumo, vi.1965 (*Japanese Primate Expedition*). To be deposited in B.M. (N.H.).

### ***Charaxes berkeleyi*** van Someren & Jackson

(Text-figs. 10–11 [aedeagus])

*Charaxes berkeleyi* van Someren & Jackson; 1957 : 52.
*Charaxes berkeleyi* van Someren & Jackson; van Someren, 1966 : 74.

This species was described from the progeny of two females captured in the Karen area of Ngong, Kenya. Details of the families are given in the original publication. Since then, several additional families have been bred from known parents. These families confirm the general characteristics on which the species was based. The species was redescribed in detail in the first section of my revisions dealing with the " Black Charaxes " in 1966 (op. cit.).

Two interesting variations were raised in a recent family and deserve mention.

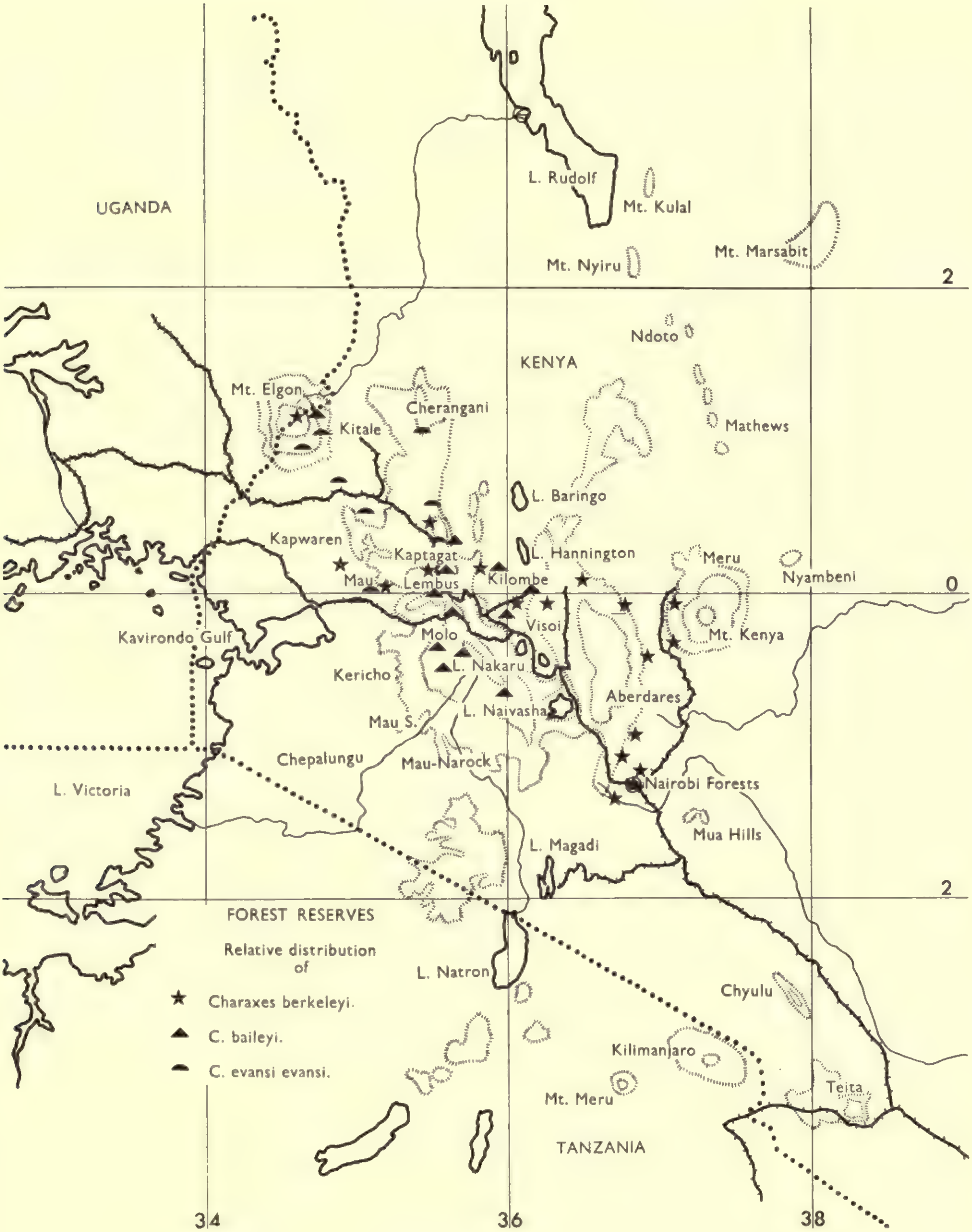
### ♀ form ***ngonga*** **forma n.**

(Pl. 29, figs. 249, 250)

*Upperside.* Similar to the nominate form in pattern, but the fore wing spots in the discal row larger and creamy white; the postdiscal spots small and creamy; the hind wing band is white with strong bluish on borders. *Underside.* Pattern similar to that of the nominate form but the discal bars are whitish.

A slight variant has the fore wing discal spots white, but the postdiscal spots are orange.

Range: The distribution of *Ch. berkeleyi*, as known at the time the species was redescribed in 1966, was given in some detail; it has now been discovered that the species occurs on the west side of the Rift Valley and extends in a north-west direction to the eastern side of Mt. Elgon, but in a distinct form worthy of subspecific rank, which is now described. (Map 1).


UGANDA
L. Rudolf
Mt. Kulal
Mt. Marsabit
Mt. Nyiru
2
Ndoto
KENYA
Mt. Elgon
Kitale
Cherangani
Mathews
L. Baringo
Kapwaren
Kaptagat
L. Hannington
Meru
Nyambeni
Mau
Lembus
Kilombe
0
Kavirondo Gulf
Molo
Visoi
Mt. Kenya
Kericho
L. Nakaru
Aberdares
L. Naivasha
Mau S.
Chepalungu
Mau-Narock
Nairobi Forests
L. Victoria
Mua Hills
L. Magadi
2
FOREST RESERVES
Relative distribution of
★ Charaxes berkeleyi.
▲ C. baileyi.
◓ C. evansi evansi.
L. Natron
Chyulu
Kilimanjaro
Teita
Mt. Meru
TANZANIA
34
36
38

Map 1.

## *Charaxes berkeleyi masaba* ssp. n.

(Pl. 29, figs. 252, 253)

FEMALE. Fore wing length 38 mm. *Upperside.* The pattern differs from the nominate race by having larger and more strongly orange spots in the fore wing and having a wider discal band in the hind wing especially in the subcostal region. *Underside.* Pattern generally similar to that of the nominate race but bolder; the ground colour exhibiting the same variation, either cold greyish or warm brownish. (Pl. 29, fig. 252.)

A slight variant may have the fore wing spots less strongly orange and thus very similar to the nominate, but the hind wing bar is always broader.

*Variation.* Some specimens exhibit a tendency for the discal and postdiscal spots of the fore wing to be slightly or strongly rayed or conjoined. There is thus a marked general similarity to the upperside pattern of some examples of *Charaxes etheocles evansi* van Someren which flies in the same area, and they could be easily confused. (Pl. 29, fig. 253).

MALE. This resembles the male of the nominate race, having well developed blue subcostal marks in the fore wing and a decided greenish postdiscal line in the hind wing.

It is of interest to note that the genitalia of *berkeleyi* differs markedly from that of *Ch. etheocles evansi* van Someren though the general facies of the upper sides are very similar.

Holotype female. N.W. KENYA: East Mt. Elgon, Teldet Estate, 1963. (Coll. Lloyd.)

Range: Most numerous in the east Elgon area from 7,000 ft. in the riverine forests and on the lower slopes at Endebess; also noted in the forest around the Keringet Dam in the Kapenguria area. It thus has a considerable overlap with *Ch. e. evansi*, with which it has hitherto been confused.

These two main aggregates, each with its restricted range, east and west of the Rift Valley, are however partially bridged by a " cline ", the members of which, though conforming in the main to the nominate race as regards pattern, have the fore wing spots richly coloured orange-ochre to tawny orange as in the race *masaba*. This cline occupies intermediate territory, west of the Rift in the Visoi-Kilombe Hill area and along the Elgeyu Escarpment to Kaptagat.

Biological Note. Food plants: there is no doubt that the principal food plant of the nominate race in the Ngong-Kikuyu-Nyeri areas is *Albizia gummifera* (Gmel.) (Leguminosae). This is also the food plant of the cline found in the Visoi-Kilombe Hill area. But, as mentioned in the original description of the species, 1957, females do occasionally lay on *Ochna insculpta* Scleumer (Ochnaceae), and on *Scutia myrtina* Kurz (Rhamnaceae). A few specimens were raised on *Scutia* on the Kinangop area.

The early stages, larvae and pupa have been described (op. cit., 1957).

## *Charaxes xiphares kilimensis* ssp. n.

(Pl. 28, figs. 244–245, 247–248)

This new subspecies of *Ch. xiphares* belongs to the north-eastern group of the species which, at the present, includes *brevicaudatus* Sch., *maudei* J. & T., *desmondi* van Som. and *kulal* van Som., in which the females exhibit a departure from the usual female pattern of the more southern group, most of which have a large ochre patch in the disc of the hind wing. In the northern group the hind wing discal patch is white with strong blue scaling on the borders or overall. The fore wing discal bar is white, while the postdiscal spots, which are pronounced, are ochreous to orange-ochre.

This new subspecies from western slopes of Mt. Kilimanjaro exhibits characters which place it intermediate between *brevicaudatus* of the northern end of Lake Nyasa and the southern highlands of Tanzania, which has very short tails in both sexes, and *maudei* of the Usambara Mts., and possibly the Ulugurus, which has very long tails in both male and female.

Male. Fore wing length 49 mm. *Upperside*. Ground colour deep blue-black with strong blue sheen in side light, base of costa browner. Discal blue spots rather small, two spots just beyond end of cell, upper one a streak, spot below larger, spot sub-basal in 4 larger and round, spot below it in 3 more elongate but smaller with a minute dot beyond, no spot in 2 and spot in 1b small and round, but mark in 1a an elongate streak widest proximally and tapering toward postdiscal line. Postdiscal series: two subapical in 8–7 white, spots in 6–4 slightly smaller and blue, spot in 3 slightly larger, that in 1b double. Margin without orange spots except for a slight indication in 1b. Hind wing with a large discal bluish white patch not reaching beyond 5, with strong blue suffusion on the borders, represented at the subcosta by a discrete blue spot; in the postdiscal row there are two discrete blue spots in the upper sector, but there are confluent blue marks on the outer border of the discal patch, with black scaling in between. Submarginal blue spots distinct from 2–6; border of wing with rufous orange lunules from anal angle to 6, edged with black. Tails black, of about equal length, 4 mm. *Underside*. Fore wing ground colour earthy grey with a slight brassy tint, the whole with a satiny sheen in side light except in mid areas of 1 and 2, which are dull; the base of the wing olive crossed by narrow black lines outlined in white; the discal spots represented in olive, proximally edged with black with a suggestion of white in between; the postdiscal spots: the two upper subapical spots ochreous, the rest golden olive, the tornal mark olive to greyish distally with conspicuous double half moon, black in centre, spot in 2 above with slight black distally. Margin with very obscure olive marks, more obvious in 1b and 2. Hind wing ground colour as fore, the sub-base crossed with zigzag olive line narrowly edged in black; the distal zone more bronzy, with a zigzag narrow whitish line from costa to 2, a narrow black line through end of cell area. Postdiscal series of spots from costa to anal angle golden olive, narrowly edged with black proximally, the mark in the anal angle a long crescent double-edged in black; submarginal spots bluish grey, those toward the anal angle with black dot distally; marginal lunules golden olive, more greenish at anal angle; margin black with very narrow white fringe. Tails mostly black with olive mid line at base.

Female. Fore wing length 55 mm. *Upperside*. Ground colour purplish brown-black in basal triangle, blacker on distal half of wing. Disc of wing crossed by a broad white curved band extending from the costa to hind margin, consisting of four elongate white marks, including white area on costa, beyond end of cell followed by an off-oval spot sub-basal in 3, the mark in 2 more elongate somewhat pear-shaped, the white mark in 1b double, small mark above, that below a blunted triangle, followed by a long streak in 1a, the marks in 1a, 1b shaded with violet scales. Postdiscal spots distinct, a large subcostal subapical mark is whitish and rounded, spot in 6 smaller, those in 5–2 smaller and orange in colour, mark in 1b double and contiguous with the discal marks. Margin with slight internervular orange marks, double in 1b. Hind wing ground colour black in basal triangle, more purplish black in dark border; disc of wing with large violet-blue patch, more whitish toward bases of 5–6, with a large whitish quadrate mark at subcosta in 8; the discal patch itself shaded with violet and on its distal border is a series of dyslegnic rounded orangish marks from 2–5. Submargin with a series of lilac-blue spots, distinct from anal angle to 5; inner margin with strong orange border of confluent lunules which shade to olive-green at anal angle; margin black with narrow white fringe. Tails black, 5 mm. long. *Underside*. Ground colour as in the male. Basal triangle of fore wing with series of strong black lines margined with bluish white, three crossing the cell and two at end of cell, with a black spot sub-basal in 1b and at sub-base with a short bar in 2. The discal white bar conspicuously outlined proximally in black; postdiscal spot white in subapical area, then increasingly orange to 1b, with the double black spot in 1b and 2 strongly marked; admargin with slight orange lunules strongest in 1b. Hind wing ground colour as fore; fine black lines outlined in white at basel triangle; discal bar represented by a pale ochre-greyish band, dyslegnic on its outer border but edged internally by a narrow black and white zigzag line; postdiscal series of rather indistinct ochreous lunules, shaded brownish in lower half, slightly more olive and more defined above anal angle; submarginal series of greyish lunules, broadly edged with black distally, touch the marginal orange-ochre lunules which shade to olive at the anal angle; extreme edge black.

Holotype male. TANZANIA: Lower slopes of West Kilimanjaro at Maua Estate, ix.1966 (Collector *Edmund*, for Major Grahame).

Allotype female. Taken in the same locality, ii.1964 (*A. F. Brown*). Both deposited in the B.M. (N.H.).

Range: This subspecies is at present known only from the West Kilimanjaro area.

## 2. THE *CHARAXES CEDREATIS-VETULA* COMPLEX

When Rothschild & Jordan published their monograph of *Charaxes* in 1898–1900, the position of many of the black males, so confusingly alike, was left in doubt; equally so, the many female forms, which could not be associated with any given males, were left in a state of chaos. Typical of this confusion are the many names, to which they added several, all lumped under the oldest named form, namely *Charaxes etheocles* (Cramer, 1777). They predicted however that in the course of time, with more extensive collecting and breeding from known parents, this aggregate would be divided into authentic species and subspecies.

A tentative re-classification of the complex was put forward by van Someren & Jackson (1952). This was based on considerable field work, breeding from known females and a re-assessment of the vast amount of material in the B.M. (N.H.), which now combines the bequests by Rothschild, Joicey & Levick, together with numerous large collections donated in the past fifty years. Very considerable use was made of collections in Continental and African museums and in private collections. During the past decade, particular attention has been paid to verifying published records by examining the actual specimens, to mapping the distribution of most of the species within this complex and to breeding them where possible.

*Charaxes cedreatis* was described by Hewitson in 1874, based on two specimens, one of which was selected as type and recorded as a male; in fact both are females. The locality was given as " West Africa ", but Hewitson refers to these specimens again in 1876, and gives the restricted locality of the type as Fernando Po. Rothschild however placed *cedreatis* as one of the numerous female forms of *etheocles* Cramer, 1777.

In 1932 I suggested that *cedreatis* Hewitson, *protocedreatis* Poulton and *lutacea* Rothschild were sexes of one species, based upon the evidence of bred families from *cedreatis* females. I did not however completely disassociate it from " *etheocles* " s. l., but this was done by van Someren & Jackson (1952).

When we reviewed this species, it seemed reasonable from the evidence before us, to recognize two races, a northern and a southern, based on slight differences in the male and considerable colour differences in the females. All the northern females were *cedreatis*, and the very few from the southern zone were *vetula* Rothschild, which we considered to be a form of *cedreatis*. We made a bad mistake, however, in recording the type locality of *vetula* as Ogowe River in Angola instead of in Gabon! Thus the type locality of *vetula* lies between the two places mentioned by Hewitson for *cedreatis*. It is also unfortunate that we selected as allotype male of *vetula*, a specimen taken at Geita, south of Lake Victoria, in Tanzania, where a female *vetula* had been captured, instead of one of the many male specimens taken in Gabon, but these we had placed as *cedreatis cedreatis*. Thus we overlooked that the two supposed races overlapped to a considerable extent.

It has now been ascertained that *vetula* occurs in eastern Nigeria, below the Obudo Plateau (St. Leger in lit.). Moreover, as a result of recent collecting it has been shown that *lutacea* males and *cedreatis* extend to Katanga and to north-western Zambia, thus cutting right across the supposed range of *vetula*. Further to the north-east, in N.W. Kenya, *vetula* and *cedreatis* have been taken in the same forests and in one instance, in the same trap. It is therefore necessary to re-assess the species in the light of our present knowledge.

### ***Charaxes cedreatis cedreatis*** Hewitson

(Pl. 1, figs. 1–6)

*Charaxes cedreatis* Hewitson, 1874 : 247, ♂, ♀ (W. Africa).
*Charaxes cedreatis* Hewitson; Hewitson, 1876 : (Restricted locality, Fernando Po).
*Charaxes carteri* Butler, 1881 : 108, ♀ (Accra).
*Charaxes etheocles cedreatis* Hewitson; Rothschild, 1900 : 484, ♀ form.
*Charaxes etheocles lutacea* Rothschild, 1900 : 485, ♂ form. (Beni, Congo). **syn. n.**
*Charaxes etheocles cedreatis* Hewitson; van Someren & Rogers, 1932.
*Charaxes etheocles lutacea* Rothschild; van Someren & Rogers, 1932.
*Charaxes cedreatis* Hewitson; van Someren & Jackson, 1952 : 276.
*Charaxes cedreatis vetula* Rothschild; van Someren & Jackson, 1952 : 277.

It has been proved by breeding that *lutacea* Rothschild is the male of *cedreatis*. The males of this species exhibit little variation on the upperside; the number and size of the blue spots on the fore wing may vary slightly. The submarginal white spots on the hind wing, usually distinct, may be small or even obscured. On the underside, as in many species of this " black complex ", the tone of the ground colour may vary, and more particularly, the strength of the black and dark brown pattern may vary from very strongly to lightly marked. These variations are not related to any geographical area but may occur throughout the distribution of the species; they may occur in a single bred family.

MALE. Fore wing length 35–36 mm. Shape slightly incurved at 3–4 on outer edge. *Upperside.* Ground colour blue-black but with strong greenish sheen toward and at base; a small blue spot at upper end of cell, a larger subcostal spot in discal line; one or two bluish to white spots in subapex; marginal glaucous spots usually distinct, largest at the tornal angle at 1b. Hind wing ground colour as fore wing, with slight greenish sheen over disc; there may be a trace of a greenish wavy postdiscal line most evident opposite the tails; submarginal linear white marks usually distinct, double at anal angle; border reddish above upper tail, or reddish mixed with greenish to anal angle; extreme edge black; tails moderately long, of about equal length, 4 mm. *Underside.* Ground colour sepia-brown, slightly browner on border; disc of fore wing with a satiny bar most evident and expanded at 4–5 and toward costa at end of cell; basal black marks usually strong up to discal line; postdiscal dark brownish spots often strong, black at tornus and outlined with greyish. Hind wing ground colour as fore wing; basal black line fine, divided by a satiny bar in sub-base and a more distinct wavy bar through discal line followed by a strong dark zone bearing the series of olive and maroon lunules which are usually strong; the border is more satiny and the submarginal line of whitish linear marks edged with black distally, strong. The margin is usually strongly reddish to upper tail then olive to anal angle, which carries two black dots.

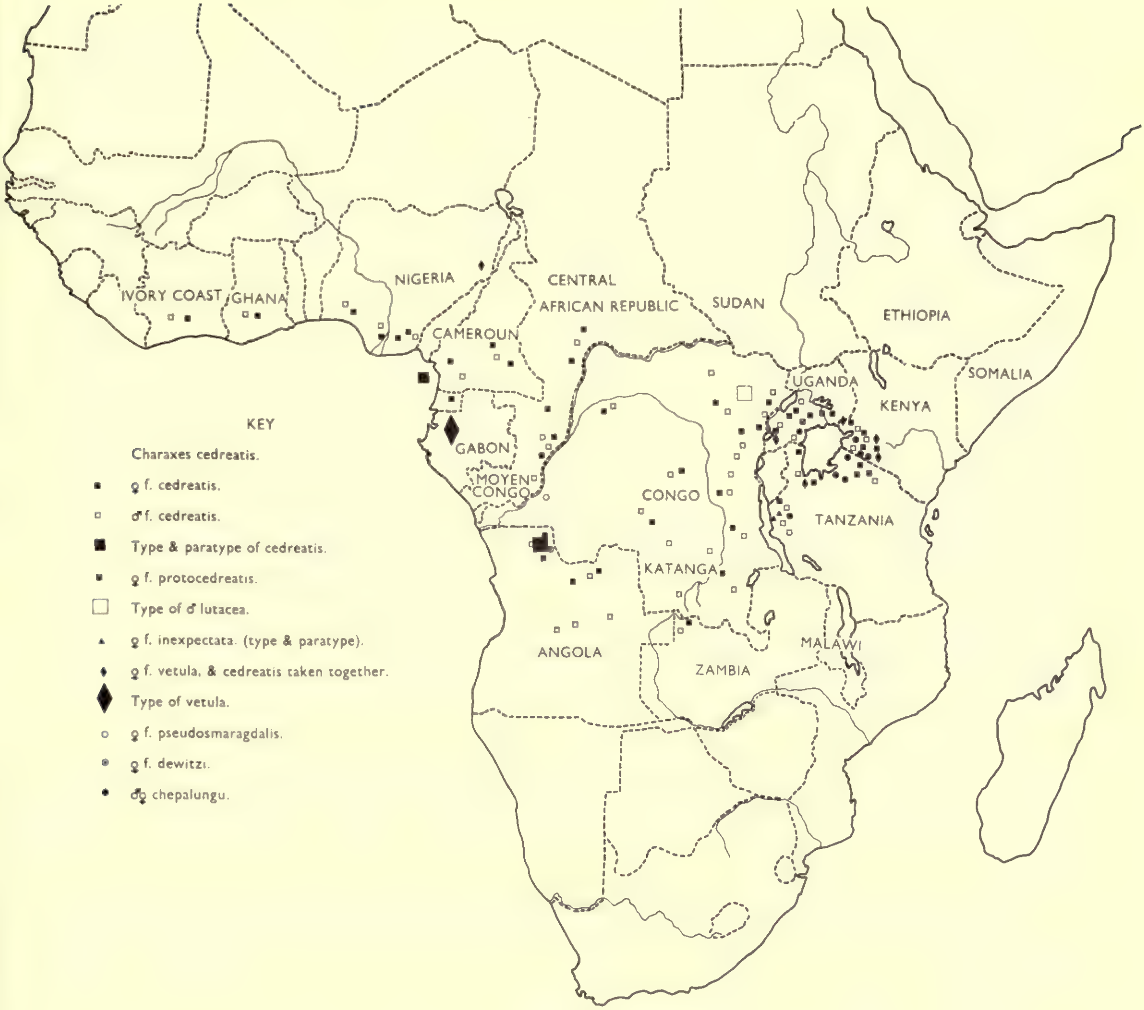
*Variation.* Exhibiting little difference on the upper side, the underside ground colour is less strongly sepia, more greyish brown, thus the satiny bars are not in strong contrast, and the dark marks at the base and lower part of the fore wing much reduced. A similar suppression of pattern is seen in the hind wing. This type of variant is well illustrated in the male we selected and allocated to *vetula* of the Geita area. (Pl. 1, fig. 5.) However, typical *lutacea* also occurs with *vetula* females, as in Gabon.

FEMALE. The type specimen is rather worn and somewhat faded. (Pl. 1, figs. 3, 4.) It exhibits certain features which are of interest from the point of view of evolution of pattern. *Upperside.* Ground colour from base of fore wing including most of the cell, the sub-base of 2, the basal area of 2b and most of 1a, dull tawny olive. A curved white bar crosses the wing from a white spot in upper part of end of cell followed by larger spots at base of 4, a larger mark basal in 3 in the discal line, a long mark in 2 and 1b representing the fusion of white marks in discal and postdiscal lines; those in the postdiscal line represented in 3–5 by small white spots and larger ones in subapex in 6–7. In addition there are two subcostal white dots in the upper discal line. Apical half of wing and outer border black, and pale whitish lunules are present on the margin, most obvious at the tornal angle. The hind wing is mostly tawny olive from the base to postdiscal line, represented at the costa by two discrete spots; the dark blackish border is narrow, widest at upper angle; the submarginal row of linear white marks distinct; marginal border above upper tail reddish then olive to anal angle. *Underside.* Ground colour brownish grey with slight olive tone; fore wing basal area with strong black marks. Pattern of above represented as whitish marks in the curved bar and as pale spots in the apical half of the wing. Black marks at and above the tornus strong. Hind wing pattern rather subdued; submarginal pale line fairly clear; margin reddish above upper tail, olive to anal angle. (Pl. 1, fig. 4.)

Although form *cedreatis* has the widest range, and indeed is the only form recorded from most of W. Africa, with the exception of type *vetula* from Gabon and another specimen from eastern Nigeria, and is the dominant one in the Congo and Uganda, its overall distribution embraces all the localities from which other female forms have been described. This precludes the recognition of any subspecies. (*Vide* Distributional Map 2.)

*Variation.* (a) Ground colour and pattern very similar to the type, but curved white bar more restricted in 1b in discal line; no white spots in upper discal line; the postdiscal white spots restricted to two in subapex. Hind wing as in nominate form. Underside dark olive-grey-brown; pattern strong.

*Variation.* (b) very similar to (a) but base of fore wing darker, more brownish olive; the spots of the white bar more restricted especially in 1b to postdiscal line. Hind wing discal area paler tawny olive. Underside more greyish olive and the pattern less strong.


NIGERIA
CENTRAL AFRICAN REPUBLIC
SUDAN
ETHIOPIA
SOMALIA
IVORY COAST
GHANA
CAMEROUN
UGANDA
KENYA
GABON
MOYEN CONGO
CONGO
TANZANIA
KATANGA
ANGOLA
MALAWI
ZAMBIA
KEY
Charaxes cedreatis.
■ ♀ f. cedreatis.
□ ♂ f. cedreatis.
■ Type & paratype of cedreatis.
■ ♀ f. protocedreatis.
□ Type of ♂ lutacea.
▲ ♀ f. inexpectata. (type & paratype).
◆ ♀ f. vetula, & cedreatis taken together.
◆ Type of vetula.
○ ♀ f. pseudosmaragdalis.
◉ ♀ f. dewitzi.
● ♂♀ chepalungu.

MAP 2.

## ♀ form ***protocedreatis*** Poulton

*Charaxes etheocles protocedreatis* Poulton, 1925 : 556.
*Charaxes etheocles protocedreatis* Poulton; van Someren & Rogers, 1932.

Somewhat like var. (b) above but curved bar of fore wing distinctly creamy ochre in 1a–1b; the discal and postdiscal spots rather obscured; no marginal spots or if present only faintly indicated at tornus. Hind wing basal area dark brownish olive but the distal half of the patch paler olive ochre contrasting with the rather wider black border; submarginal spots rather obscured; marginal border as usual. Underside ground colour olive greyish; pattern rather obscured except for curved bar of fore wing. (Pl. 2, fig. 15.)

### ♀ form ***inexpectata*** **forma n.**

This remarkable form would seem to be a development from *protocedreatis* but exhibits a pattern unlike any other in *cedreatis*. *Upperside*. The fore wing pattern is basically similar to that of nominate *cedreatis*, but the basal tawny olive area is darker and more restricted in 1a–2 by a prolongation of the discal pale marks of the curved white bar in these areas basad; this bar is white in its upper segments then becomes creamy in colour. The distal half of the the wing is black, but the spots in the upper discal line and those of postdiscal row are large and distinct though that in 4 is obscured. The marginal spots are mostly small, but those at the tornal angle, large, especially in 1b. The base of the hind wing is tawny olive but encroached upon by the wide creamy band which is complete from the costa to just above the anal angle.; there is some tawny olive scaling on the lower outer border. The black border is widest at 7–6 then narrows slightly and carries the usual series of submarginal linear white marks; the marginal border reddish above the upper tail becomes olive to the anal angle; extreme edge black. Tails long, upper rounded at end, 6 mm. long, lower pointed 5 mm., black with median orange-red line. *Underside*. Ground colour greyish olive, slightly darker brownish at border of fore wing; basal black marks strong to discal band; the pattern of above showing up strongly and pale cream in colour; postdiscal row of dark spots distinct from subapex to tornal angle where they are black. Hind wing ground colour greyish olive at base crossed by fine black lines; discal band strongly marked but less wide than above tapering from mid point to above the anal angle, bounded distally by a strong row of olive-maroon lunules; border slightly darker olive-grey with submarginal row of linear white marks strong carrying black dots in lower segment in region of tails; marginal border narrow, reddish above upper tail then olive to anal angle.

Holotype female. TANZANIA: N.E. of Lake Tanganyika, Kigoma district, Mukuyu Forest, 5,200 ft., iv.1965. Captured by Major I. Grahame's collector. To be deposited in the B.M. (N.H.). (Pl. 2, figs. 13, 14.)

A second specimen has the upper spots of the fore wing white; and those of the curved bar slightly less ochreous. The hind wing band is wider and slightly more whitish. Taken at Muhimo, Kigoma district, N.E. of Lake Tanganyika, vi.1965 (*Japanese Primate Expedition*) (Pl. 1, figs. 7, 8.) The associated males are typical *lutacea*.

Two examples of this new form have recently been taken in the Ivory Coast by A. Gallay, and a third specimen by the late Mr. T. H. E. Jackson's collector in the same area.

### ♀ form ***vetula*** Rothschild

*Charaxes etheocles* f. *vetula* Rothschild *in* Rothschild & Jordan, 1900 : 488.

The type came from Ogowe River, Gabon, and is figured in Rothschild's monograph. This type locality is thus within the range of nominate *cedreatis* Hewitson.

*Upperside*. Pattern is very similar to *cedreatis* as regards the curved fore wing bar, but the basal area is brownish black; the distal half of the wing black, with an indication of a white subcostal spot in the discal line, two white spots in subapex while those of the postdiscal series are faintly indicated. The inner ends of the white marks in 1a–1b are bluish; marginal pale spots faint, most obvious at tornal angle. Hind wing basal area brownish black; disc of wing with a large blue patch tapering toward the anal angle, represented at subcosta by two blue spots one in discal and one in postdiscal line; border black, widest at upper angle; submarginal row of linear white marks very distinct; marginal border reddish to between tails then olive to anal angle. Tails moderately long, 5 and 4 mm. *Underside.* Ground colour greyish olive or pale brownish, darker on border of fore wing. Basal black marks strong or weak; white curved bar distinct; a satiny quadrate mark sometimes present at subapex; submarginal series of dark spots are black at tornus but fading out toward the apex. Hind wing ground colour greyish olive or brownish, pattern rather obscured except in lower part of postdiscal line; submarginal pale line usually distinct; marginal border mostly brick-red but olive at anal angle. (Pl. 2, figs. 9, 10, Type. Gabon.)

*Variation.* (a) *Upperside.* Very similar to nominate specimen but some indication of dark ground colour invading the white marks in 1a–1b in the line of junction of the discal and postdiscal spots; upper subcostal spots in discal row free; spots of upper postdiscal row small but distinct. *Underside.* With a rather stronger pattern, division of discal and postdiscal white marks 1b–2 clearly indicated; submarginal marks in fore wing not strong. Hind wing with satiny bar in discal line; lunules large in postdiscal zone; submarginal row of white spots distinct. Geita, Tanzania.

*Variation.* (b) *Upperside.* Basal area blacker with distinct blue sheen, particularly toward the inner edge of the curved white bar, the blue colour suffusing most of the marks in 1a–1b; subcostal mark in discal row faint or absent, but postdiscal spots are blue; marginal spots glaucous but faint except for double mark at tornal angle 1b. Hind wing ground colour at base, black, black also along costal border thus restricting the upper border of the strongly blue patch in the disc; submarginal row of linear marks bluish white, more strongly blue at anal angle; marginal border a mixture of reddish and glaucous to upper tail then olive to anal angle. Tails shorter: 4 mm. *Underside.* Ground colour olive greyish, brownish on border; pattern rather obscured except for white bar in fore wing and white submarginal spots in hind wing. (Pl. 2, fig. 11, Kakamega, Kenya.) (Rydon Coll.).

*Variation.* (c) *Upperside.* Very similar to (b) with the same strong blue invading the proximal two thirds of bar spots in 1a–1b. The hind wing blue band goes right through to the costa and crosses the inner fold above the anal angle. *Underside.* Ground colour and pattern as in (b). (Pl. 2, fig. 17, Visoi Gap, Kenya.) (Bailey Coll.)

## ♀ form **pseudosmaragdalis** van Someren & Jackson

*Charaxes cedreatis vetula* ♀ f. *pseudosmaragdalis* van Someren & Jackson, 1957 : 50.

At present known only from a single specimen taken in the Djelo-Binza area of Leopoldville, lower Congo. It bears a superficial resemblance to the male of *Charaxes smaragdalis smaragdalis* Butler.

*Upperside.* Base of fore wing brownish black with a strong greenish blue suffusion up to the discal line, with a stronger blue sheen in the cell. Discal spots large, two upper elongate, bluish white, a rounded mark sub-basal in 4, that in 3 more quadrate and set out a little, followed by and conjoined to larger blue mark in 2, and a larger mark in 1a–1b conjoined to the blue spot in postdiscal row, the remaining postdiscal spots in 2–5 in a slight curve terminate in the two larger subapical spots which are white. Margin with indication of diffuse glaucous marks. Hind wing basal area as fore wing merging into the blue discal patch which extends from the costa to above the anal angle. Border black with distinct linear white marks; margin with reddish scales to upper tail then olive to anal angle. *Underside.* Light rufescent brownish; black lines thin to discal zone; pattern of upperside represented by slight greyish brown marks, the lower postdiscal ones margined in black, proximally in 1b–2 where the tornal marks are black. Hind wing ground colour as fore wing, a pale bar present in the discal line finely outlined in black proximally; the postdiscal row of buff and maroon lunules strong; whitish marks in submargin strong; border reddish above upper tail then olive to anal angle carrying black dots in region of tails. (Pl. 3, figs. 18, 19, deposited in Central African Museum, Tervuren, Belgium.)

### ♀ form **dewitzi** Butler

*Charaxes alladinis* Dewitz, 1887 : fig. 8.
*Charaxes dewitzi* Butler, 1895 : 255.

The type of this insect is lost. It was described as the male of *alladinis* Butler by Dewitz, but was subsequently shown to be a female and was renamed *dewitzi* by Butler. It is figured in colour in Dewitz' original paper. It appears to be nearest to the female form *pseudosmaragdalis*, differing mainly in the absence of the postdiscal spots in the fore wing other than the two subapical ones; otherwise, the descriptions agree very well. The specimen came from Pungo Andongo in northern Angola. (Pl. 3, fig. 20, [photograph of original figure.])

## ***Charaxes chepalungu*** **sp. n.**

(Pl. 3, figs. 21–25)

*Charaxes cedreatis vetula* Rothschild; van Someren & Jackson, 1952 : 278.

This species was briefly referred to, with a query, in van Someren & Jackson (1952), under the heading *Charaxes cedreatis vetula*. Two females and several males were taken in the Chepalungu Forest, lower Sotik in September, 1949 and several males in the Mara district. Subsequently, an interesting gynandromorph, male on right side, female on left, was taken by the late R. T. Evans at the edge of the Chepalungu Forest. The male half agrees exactly with the males taken previously, and the female side with the previously known females, tentatively placed to *vetula*. Since these males do not agree with any form of *lutacea*, the male of *cedreatis vetula*, it becomes desirable and necessary to disassociate the Chepalungu insect from *cedreatis*; moreover, *cedreatis ♂ lutacea* occurs in the Mara area.

MALE. Fore wing length 31–33 mm.; shape of fore wing only slightly incurved on outer border, thus somewhat resembling *Charaxes ethalion*. *Upperside*. Fore wing ground colour velvety black with slight indication of glaucous spots on margin between veins; blue subcostal spots very small and limited to one beyond end of cell and one in subapex, or these spots may be obscured. Hind wing ground colour velvety black; submarginal row of spots whitish, very small and may be obscured; marginal border greenish or with very slight maroon scaling above upper tail, all rather obscured Tails short, robust, upper 3 mm. lower 4 mm. Margin at veins slightly dentate. *Underside*. Fore wing ground colour greyish brown basally, more brownish on distal third; slight satiny bars in discal and postdiscal lines; basal black lines thin or may be strongly indicated in lower half of wing especially at tornus, with submarginal dark marks diminishing toward subapex. Hind wing ground colour greyish brown with a satiny bar in discal line, followed by a darker brownish bar distal to which the postdiscal zigzag band of lunate olive and maroon may be strong, or may be mainly olive in colour. Submarginal row of linear marks lilac or greyish with black dots present in region of tails, double at anal angle; margin narrowly maroon above upper tail then olive to anal angle. There is some variation in the strength of the underside pattern.

FEMALE. Fore wing length 35–36 mm. *Upperside*. Ground colour basal area blackish brown, distal half black, separated by an oblique white bar made up as follows: a small white spot at upper end of cell, a quadrate mark beyond end of cell followed by an elongate triangular, at base of 3, a long white mark in 2 extending to postdiscal line, the marks in 1a–1b blue shading to white in postdiscal line; the postdiscal spots small and obscured in 3–5, but the subapical punctiform and white; one or two obscure whitish marks midway in 6 and subcosta. Margin with obscure internervular glaucous marks. Hind wing brownish black at base followed by a large irregular blue discal patch, tapering toward the anal angle, represented in subcosta by blue marks in postdiscal line; border black, carrying distinct linear white marks on outer edge; margin reddish from above upper tail to base of lower, anal angle olive. Tails rather thin, upper 5 mm., lower 3 mm., black edged with maroon-olive mid line. *Underside.* Fore wing ground colour clayish brown with white pattern of above well represented and with pale satiny spots in the postdiscal row; black tornal spots strong but black lines toward base rather fine. Hind wing ground colour clayish brown with fine black lines at basal area; postdiscal zigzag line of ochreous olive-maroon lunules fairly well marked.

*Variation.* In one specimen, the white marks in the fore wing rather more extended and the hind wing blue patch more extended basad over cell.

Holotype male. N.W. KENYA: lower Sotik area, Chepalungu, viii.1950 (*van Someren*).

Allotype female. Same locality, ix.1946 (*van Someren*). Deposited in B.M. (N.H.).

Range: The topotypical series of ten males and three females were taken in the Chepalungu Forest in lower Sotik and in the riverine forests along the Mara River. Identical males have been captured in the Serengeti Game Park across the border in Tanzania. Two males which appear to belong to this species are recorded from Mukuyu in the Kigoma area, Tanzania. There is thus an overlap with both *cedreatis* and *ethalion* ssp. The species has not been bred, but the capture of the gynandromorph verifies the association of males and females. (Map 2.)

Males were dissected by Mr. Bennett of the B.M. (N.H.) who reports that they differ appreciably from *ethalion*, and are more sinuate than *lutacea* (Text-fig. 20 [aedeagus]) with the toothed lobe placed less toward the distal end of the aedeagus.

## SYSTEMATIC LIST

### ***Charaxes cedreatis*** Hewitson

*Charaxes cedreatis cedreatis* Hewitson, 1874. Type locality: Fernando Po. Ranges of various forms:

Synonym: *lutacea* Rothschild, 1900.

♀ f. *cedreatis* and variants:

W. Africa: Ivory Coast, Ghana, French Guinea, Fernando Po, French Cameroons, N. Angola, Congo central, Kasai, Katanga.
Uganda: S.W., W., C. and E. Uganda.
Kenya: N.W. Kenya, Trans Nzoia, Kaimosi, S. Kavirondo, Nandi, Lumbwa, Ravine, Lembus, Pekera Gorge, Visoi Gap-Kilombe Hill; all west of the Rift Valley.
Tanzania: Usukuma, Serengeti, Geita, south of Lake Victoria; Bukoba and south of the Kagera River; N.E. Lake Tanganyika, Kigoma.
Zambia: Mwinilunga area.

♀ f. *protocedreatis* Poulton, 1925. Type locality: Uganda, Jinja.

Uganda: Central and eastern; Jinja.
Tanzania: Serengeti, Orange River forest.

♀ f. *inexpectata* forma n. Type locality: Tanzania, Kigoma, Mukuyu Forest.
Tanzania: Kigoma area, Mukuyu Forest, and Muhimo.

♀ f. *vetula* Rothschild, 1900. Type locality: Gabon, Ogowe River.
W. Africa: Gabon, Ogowe R., Eastern Nigeria below Obudo.
Tanzania: Geita, S.W. Lake Victoria. (1 specimen.)
Uganda: Rutenga, Kigezi, S.W. Uganda. (1 specimen.)
Kenya: Kaimosi Forest, N. Kavirondo; Kilombe Hill, Visoi Gap, (4 specimens.)

♀ f. *pseudosmaragdalis* van Someren & Jackson, 1957. Unique.
Type locality: W. Congo, Leopoldville district, Djelo Binza.

♀ f. *dewitzi* Butler, 1895. Var. of above?
♂ Type locality: N.W. Angola, Pungo Andongo.

### ***Charaxes chepalungu*** sp. n.

*Charaxes chepalungu* sp. n. Type locality: Kenya, Chepalungu Forest, Lower Sotik. Range: Kenya, Chepalungu, Mara River and Tanzania, Serengeti.

## 3. ***CHARAXES VIRILIS*** ROTHSCHILD, ***C. KHEILI*** STAUDINGER, ***C. NORTHCOTTI*** ROTHSCHILD and ***C. MAFUGA*** VAN SOMEREN

### ***Charaxes virilis*** van Someren & Jackson

*Charaxes etheocles* ♀ f. *virilis* Rothschild; van Someren & Jackson, 1900 : 487.
*Charaxes etheocles* ♀ f. *virilis* Rothschild; Aurivillius *in* Seitz, 1912 : 136.
*Charaxes etheocles* ♀ f. *virilis* Rothschild; Poulton, 1918 : 71–73.
*Charaxes etheocles* ♂ f. *lenis* Jordan, 1929 : 483. Type loc., Uganda, Mulange, Mabira Forest.
*Charaxes virilis* van Someren & Jackson, 1952 : 283–284.

The type of *virilis* is a female and was described as a female form of *etheocles* by Rothschild in 1900. Poulton (1918) refers to a series of specimens bred from larvae found feeding on *Adenthera pavonina* L. (Mimosoidea), (native to Tropical Asia, and introduced into other parts of the Tropics) at Ibadan, S. Nigeria by Lamborn and Farquharson. The series contained four males and three females and Poulton makes special reference to the females which are male-like, though somewhat variable. No particular mention is made of the males, which is somewhat surprising since the male of *virilis* had not been described. Dr. Jordan examined the material and agreed that the females were nearer to *virilis* than to *alladinis* Butler. The males were apparently considered to be just *etheocles* (Cramer). In 1929 Dr. Jordan described *etheocles* male form *lenis* (not *leonis* as given by Wallace Peters, 1952). There were three specimens taken in the Mabira Forest, Uganda. He did not associate these males with female *virilis*, but he compared them with "*etheocles*" ♂ form *cytila* which I now know to be the male of *manica* Trimen, 1894. There is no doubt that *lenis* is the male of *virilis*, which is a species distinct from *etheocles* (Cramer) (s. str.). Whether *virilis* can be divided into western and eastern geographical races will now be discussed.

Western aggregate, topotypical material: Ghana to Cameroon and Congo.

Male. Fore wing length 33–35 mm. Shape somewhat like *ethalion*, the outer border of fore wing only slightly incurved at 3–4. *Upperside.* Ground colour velvety black with a strong overall blue sheen, more especially over the cell. Blue spots in the subcostal area rather variable, but there is usually one at the upper end of cell, one beyond in discal line, no spots in subapex; marginal glaucous lunules ill-defined but often contiguous at the hind angle. Hind wing black, sometimes with a very faint indication of a greenish or bluish wavy line, strongest opposite to tails; submarginal row of linear marks, bluish white or blue, complete; border reddish or bluish green above upper tail then more olive at anal angle; tails short and thin, upper sometimes stumpy 5–4 mm., lower 3–4 mm. *Underside.* Somewhat variable, usually clay-coloured with a purplish brown tone overall; satiny bars more greyish; black dots and lines in basal triangle of fore wing distinct, but rather obliterated in distal half, but tornal black mark strong. Hind wing ground colour as fore wing, basal black marks fine and indistinct; sub-basal and discal satiny bars fairly distinct; postdiscal wavy line of olive and maroon lunules defined but may be somewhat obscured in the general brownish tone; submarginal line of lilac marks with black dots distally in region of tails fairly strong; marginal border narrow, slightly reddish above upper tail then olive to anal angle.

*Variation.* Some specimens may have the fore wing devoid of blue spots in the costal area and the marginal lunules may be very small. The underside ground colour more greyish brown and on the hind wing the satiny bars may be strong. An aberration is figured in which the subcostal spot in the discal line is enlarged and elongate, represented by two long, contiguous, blue streaks; the ground colour more purplish brown. (Pl. 4, fig. 32.)

### Eastern aggregate. Uganda, from Budongo Forest to Kenya border.

Male. Eastern males are, on the whole, more compact looking than their western counterparts, due mainly to the fact that the outer margin of the fore wing is less incurved, the wing thus looks less elongate. *Upperside.* The subcostal blue marks vary in number and size; the marginal glaucous marks are usually obscured. On the hind wing the submarginal whitish marks are usually distinct and well developed. *Underside.* Pattern variable, weak, moderate or fairly strong but always with a strong vinaceous or rusty purple bloom overall. The postdiscal wavy line of lunules well marked.

There is thus little to distinguish western from eastern males on the upper side. In shape, eastern males are more compact and the underside is more rusty, or cinnamon-brownish with a strong vinaceous tone overall. (Pl. 4, figs. 34–37.)

### Western aggregate.

Females. The type female on the upperside is blue-black with steel-blue reflections especially on the hind wing. Fore wing marks limited to one blue subcostal spot in discal line; margin with large glaucous lunules. Hind wing with a indication of obscured greenish blue row of spots in the postdiscal line; submarginal white spots large and distinct. Border ochre reddish above upper tail, more olive to anal angle; edge black; tails thin, upper 6 mm., lower 5 mm. (Pl. 4, figs. 26, 27.)

*Variation.* Topotypical females exhibit a considerable degree of variation in the upper side markings. They may be as in the type or (a) there may be obscure marks in 2–3 in the discal line and obscure marks in the postdiscal row from sub-apex to 1b; (b) the spots on the fore wing may be purplish, though obscured in the postdiscal line and represented in the hind wing in the same zone by purplish marks; (c) the fore wing spots may be as in (b) but discal and postdiscal spots slightly whitish.

The undersides in all these forms are similar, clayish brown, slightly darker brownish between the discal and postdiscal zones and in the curve of the wing. The pattern of black marks usually thin and faint except for the black tornal mark and one more proximad in the same area, the tornal mark with a greyish surround. The hind wing ground colour as fore with very faint marks in the basal half; the postdiscal row of lunules obscured, but the submarginal series of pale marks to the anal angle fairly strong. The border reddish to the upper tail then olive to the anal angle; the postdiscal mark above anal angle strong with an irregular whitish mark above it.

Females from the Moyen Congo area exhibit the same variations on the upper side but the pattern of the underside is stronger. (Pl. 4, fig. 31.)

Eastern aggregate. Uganda.

FEMALES. These exhibit the same character as regard shape as noted in the males. The markings on the upperside of the fore wing as in western examples, but less strong, but the marginal glaucous lunules are stronger; the submarginal white marks on the hind wing larger and stronger. The underside pattern is stronger and the ground colour richer vinaceous cinnamon-brown. (Pl. 4, figs. 28, 29.)

Whether or not the combined characters of males and females of the eastern aggregate warrant subspecific ranking is a matter of opinion; if so, the name *lenis* Jordan, applied to the eastern male (Mabira Forest, Uganda) is available, the western aggregate being *virilis*.

The species has not been bred in the east.

Range: The Western aggregate: Ivory Coast—Ghana to Nigeria, Cameroon, Central African Republic, Moyen Congo, Central Congo eastward to Semliki River and south to upper Katanga.

The Eastern aggregate: Uganda, from the Budongo Forest in the west to Busogo in the east to the Busia area on Kenya border. (Map 3.).

## ***Charaxes kheili*** Staudinger

(Pl. 5, figs. 38, 39, 40, 43)

*Charaxes kheili* Staudinger, 1896, *Iris* **9** : 216.
*Charaxes kheili* Staudinger; Rothschild, 1900 : 473.
*Charaxes kheili* Staudinger; Jackson, 1957 : 66–67. (*partim*).

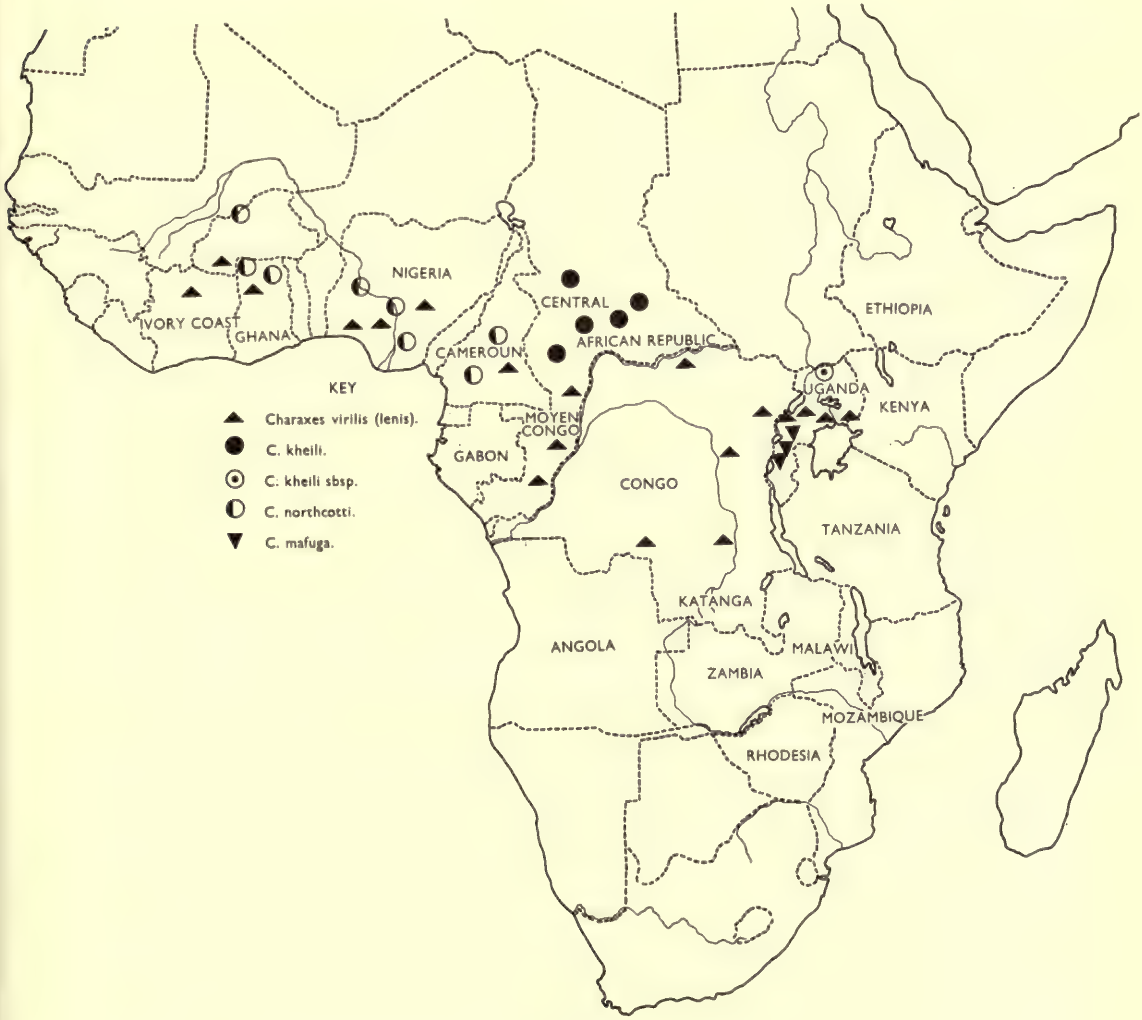
This species is still rare in collections, and little is known about it, the female being still unknown.* The type is in the Berlin Museum and was kindly forwarded to the B.M. (N.H.) in 1956 for examination and dissection of genitalia when the late Mr. T. H. E. Jackson was working on the butterflies of the Kigezi country, Uganda, more particularly on the species of black males of the " *etheocles* group " which exhibited characters very similar to the description of *kheili* Staudinger. Jackson came to the conclusion that these black males were not *kheili*, and referred them to *cedreatis vetula* on the evidence of a *vetula* female taken in the same area. I have now separated these males under the name *Charaxes mafuga* sp. n.

The type of *kheili* was taken in the Njam-Njam savanna country in the north of what is now the Central African Republic. I have been able to locate a second specimen taken in the same general area (unfortunately without exact data label) in the Central African Museum, Tervuren, Belgium and this has been sent to me by Dr. Berger for critical examination. Dr. Berger informs me that the Museum has three other male specimens taken at Sassa & Yakoma in the Njam-Njam country, which agree with the specimen sent.

---

* The female has now been taken and will be described by MM. J. Plantrou & Drage.

MALE (type). Fore wing length 36 mm. *Upperside.* Ground colour black with blue sheen at base and over cell; pattern: a blue spot at upper cell-end, two spots beyond, the subcostal one large and whitish the lower small and bluish; three subapical spots in line, upper ones whitish, in postdiscal row with spots in 4–3 set in a little, that in 2 set out a little followed by an elongate double mark in 1b and a transverse mark in 1a, on hind margin; marginal glaucous marks complete and distint. Hind wing ground colour black, with a strong greenish blue postdiscal irregular band extending from above anal angle and terminating in a small spot in 6; submarginal linear marks bluish and well marked; border bluish to lower tail then olive at anal angle; extreme edge black with slight white fringe. Tails rather thin, of about equal length, 5 mm. *Underside.* Greyish brown with darker brown zone between paler discal line and postdiscal series of paler spots, both proximally outlined in black; submarginal dark marks, black at tornus become less distinct up to subapex. Basal lines moderate. Some satiny


NIGERIA
IVORY COAST
GHANA
CENTRAL
AFRICAN REPUBLIC
CAMEROUN
ETHIOPIA
UGANDA
KENYA
KEY
▲ Charaxes virilis (lenis).
● C. kheili.
⊙ C. kheili sbsp.
◐ C. northcotti.
▼ C. mafuga.
MOYEN CONGO
GABON
CONGO
TANZANIA
KATANGA
ANGOLA
MALAWI
ZAMBIA
MOZAMBIQUE
RHODESIA

MAP 3.

sheen over discal and postdiscal zones. Hind wing, ground colour as fore wing but more uniform, as basal lines are fine, but satiny bar in sub-base and in discal line moderately strong; postdiscal irregular line of lunate marks, ochre-olive and maroon well marked; submarginal row of linear marks strongest in region of tails; border reddish to upper tail then olive to anal angle, which carries double black spots. (Pl. 5, figs. 38, 39.)

*Variation.* Fore wing. *Upperside.* Subcostal marks not so marked; the postdiscal row not so strong from 2–4, but there is an indication of a blue mark in discal line sub-basal in 3; marginal glaucous marks smaller. Hind wing postdiscal blue-green band strong as in type but extending to 5 only. *Underside.* Not so strongly marked and more uniform on the hind wing.

Range: The known range of this species appears to be the savanna country to the north of the Central African Republic in the region of the Shari-Ubanji River. How far south it extends is uncertain, but there is a record of the insect from north of Bangui (J. Plantrou, in lit.). (Map 3).

I have before me an interesting specimen of a male *Charaxes* taken by one of Mr. Jackson's collectors at Metu, West Madi, Nile Province, Uganda, which closely resembles the variety of *Charaxes kheili* mentioned above as regards the upperside of both wings with the exception that the marginal glaucous marks of the fore wing are larger and more diffuse. The underside however, though resembling *kheili* in general pattern, is more strongly variegated, the markings being stronger, thus having a marked resemblance to this respect to the underside of a boldly marked variation of *Charaxes northcotti* from the Bouar area of Central African Republic (Cf. fig.) described later. (Pl. 5, figs. 40, 43.)

It is impossible to gauge the degree of variation of the underside of *kheili* owing to paucity of material.

## ***Charaxes northcotti*** Rothschild

(Pl. 5, figs. 41, 42, 46)

*Charaxes northcotti* Rothschild, 1899, *Nov. Zool.* **6** : 171, Pl. 8, fig. 5.
*Charaxes northcotti* Rothschild; Peters, 1952 : 54.

There appears to be some justification for uniting *northcotti* with *kheili*, but the evidence is not entirely conclusive. The ranges of the two do not seem to overlap, but adequate material of each is sadly lacking, and only males are known.

MALE. Fore wing length 36–38 mm. *Upperside.* Ground colour black with a slight greenish sheen over base of fore wing. The pattern of the fore wing is very similar to that of *kheili*, but the blue markings in the postdiscal series are larger, and in the discal row there is a large spot sub-basal in 3 and a smaller one below in 2. In the hind wing the postdiscal greenish blue band is wider than in *kheili*, and the outer margin nearer to the submarginal row of blue linear marks and on the inner border it extends proximad toward the cell so that the widest portion is in area 4–5, but the width is somewhat variable. The border of the wing is blue-green to lower tail then olive at the anal angle. Tails rather short and sharply tapering, upper 4 mm., lower 3·5 mm. *Underside.* Although the dark pattern is essentially similar to that of *kheili*, the black marks are finer and the satiny bars less obvious due to an overall darker more brownish tone; this applies to both wings.

This general description is based on the type and a paratype which came from the "Gold Coast, Gambaga, near the Volta River". (Pl. 5, figs. 41, 42.)

*Variation.* An interesting male specimen which would appear to be a variant comes from the Boar area of the Central African Republic. It differs from the nominate form in having a much bolder pattern of blue spots on the upperside of the fore wing, with indications of additional spots in 1b; on the hind wing the postdiscal blue patch is wider throughout, especially in 2–4; the submarginal spots are bolder and the border is wider. On the underside, the pattern is bolder, the fore wing discal and postdiscal spots more defined and the basal black marks stronger. The hind wing pattern is also bolder giving the whole underside a " spotted " appearance. (Pl. 5, fig. 46.) More material from this area may show the characters to be constant and the aggregate may constitute a good subspecies.

Range: The nominate form is known from the Volta River area and Kumasi of the Ghana Republic (Gold Coast) and extends eastward into Nigeria, N.E. of Enugu. (Map 3).

### *Charaxes mafuga* sp. n.

(Pl. 5, figs. 44, 45, Text-fig. 9 [aedeagus])

*Charaxes cedreatis vetula* Rothschild; Jackson, 1957 : 66.

This insect is represented by a long series of males taken in the high rain forests of Mafuga-Rutenga, 7,000–8,500 ft., Kigezi district of Uganda.

Its true position has remained a puzzle; no authentic females can be associated with it. On the evidence of one very battered female, identifiable as *vetula* Rothschild, taken in the Mafuga area, Jackson associated it with these males (tentatively, it is true) but he placed the males to *cedreatis vetula* Rothschild. However, these Mafuga males do not agree with males of *cedreatis* which Jackson placed to *cedreatis vetula* of the Geita area, Tanzania, nor with *cedreatis* males (*lutacea* Rothschild) from northern Angola, or elsewhere. I have already shown that *lutacea* males are variable, above and below and have expressed the opinion that *cedreatis vetula* cannot be upheld as a subspecies, because the form *vetula* crops up here and there within the range of the species, from Nigeria to N.W. Kenya.

There is a superficial resemblance on the upper side of the Mafuga insect and *C. kheili* Staudinger of the savanna country to the north of the Central African Republic, in the Njam-Njam country. (Cf. Pl. 5, fig. 38). The habitats of the two are thus totally different. The shape of the two are unlike, *kheili* having a more pointed acuminate fore wing. No significant difference can be noted in the genitalia according to Bennett.

It seems advisable to consider the Mafuga insect distinct; it is certainly not conspecific with *cedreatis* (male *lutacea*).

MALE. Fore wing length 44–46 mm. Shape of fore wing broad and slightly incised at 3–4 on outer edge though the tornal angle projects slightly at vein 2. *Upperside.* Ground colour blue-black with a slight overall greeny tinge to the hind wing. Fore wing with an obscure blue spot at end of cell followed by two distinct blue spots sub-basal in 5–6 the upper one large; three subapical spots in a row followed by a complete row of less distinct blue postdiscal spots, largest and double in 1b; margin with distinct glaucous marks, double at tornus. Hind wing with a row of postdiscal greenish contiguous lunules from above anal angle to 5; complete row of submarginal linear marks bluish green, whiter at upper angle, distinct, double at anal angle; marginal border dark maroon above upper tail then olive to anal angle; edge black. Tails rather short, upper 4 mm. lower 5 mm. black-edged, with greenish mid line. *Underside.*

Ground colour sepia-brown, darker in interspaces, with strong satiny bars, quadrate at end of cell, a zigzag line in discal zone, with a more continuous zone in postdiscal zone, widest in subapex and most distinct, almost whitish in 1b opposite and adjoining the strong black tornal mark, with more brownish marks to subapex; margin of wing shaded brownish in the curve but greyish at tornus. Hind wing ground colour slightly stronger brownish but satiny bars strong, especially in sub-base and through the discal line; postdiscal row of ochreous olive and maroon lunules, outlined proximally in black, strongly marked; submarginal row of linear whitish lilac marks strong; marginal border dark reddish to upper tail then olive to anal angle. The strength of the variegated underside pattern depends on the distinctness of the satiny bars.

Holotype male. S.W. UGANDA: Kigezi County, at Rutenga-Mafuga Forest, 7,000 ft., vi.1951 (*van Someren*). In B.M. (N.H.)

Paratype male. Same data.

The female is not yet known, with certainty.

Range: The species was particularly plentiful in the high rain forests of Mafuga and Rutenga, in Kigezi; and the males came readily to ground bait, particularly excrement of carnivores, less so to banana smeared on tree trunks. (We had not adopted traps as a method of capture in those early days.) (Map 3).

## SYSTEMATIC LIST

### ***Charaxes virilis*** van Someren & Jackson

*Charaxes etheocles* ♀ f. *virilis* Rothschild, 1900. Type locality: " West Africa ". Range: Western aggregate; Ivory Coast, Ghana to Nigeria, Cameroon, Central African Republic, Moyen Congo, C. Congo eastwards to Semliki River and south to Upper Katanga. Eastern aggregate; Uganda, from Budongo Forest in west to Busogo in east to Kenya border (Busia area).

### ***Charaxes kheili*** Staudinger

*Charaxes kheili* Staudinger, 1896. Type locality: Central African Republic, Njam-Njam. Range: Central African Republic in Shari-Ubanji River area and possibly north of Bangui.

### ***Charaxes northcotti*** Rothschild

*Charaxes northcotti* Rothschild, 1899. Type locality: Ghana, Gambaga. Range: Ghana, Volta River and Kumasi to Nigeria, north-east of Enugu.

### ***Charaxes mafuga*** sp. n.

*Charaxes mafuga* sp. n. Type locality: S.W. Uganda, Kigezi County, Rutenga Forest. Range: S.W. Uganda.

## 4. THE ***CHARAXES ETHEOCLES*** COMPLEX

The bewildering number of African *Charaxes* with black males exhibiting hardly any or only slight differences, has given rise to a great deal of confusion. Before Rothschild and Jordan (1896–1900) produced their monograph of *Charaxes*, there was little or no evidence supporting the allocation of many of the equally numerous females with any given males, or vice versa. The confused state confronting them can be gauged by the long list of described males and females under the heading " *Charaxes etheocles* " to which were added many more names, both males and females, as members of the complex.

During the past fifty years some attempt has been made to breed the various " suspected species " from known females. A study of these families has provided evidence that certain males are definitely associated with certain females, and the degree of constancy in this respect, coupled with the constancy of external characters, supported the view that several distinct species were involved in this " complex ". Characters of the larvae in various stages and food preference were also noted.

In 1952 an attempt was made to disentangle the muddle, utilizing as evidence the breeding results obtained up to that date, coupled with close field observations relative to distribution, general ecology, etc. (van Someren & Jackson, 1952 and 1957).

Additional data has come to hand during the past decade which necessitates a further modification. Some of the more obvious species in the " complex " have been dealt with previously in the present series of Revisions; many of the names listed by Rothschild as " forms of *etheocles* " have been elevated to specific or subspecific rank.

The present paper deals with *Charaxes etheocles* (Cramer) (sens. str.) on a Pan-African basis. The species ranges from Sierra Leone through the Congo to N.W. Kenya; it also occurs in N. Angola, eastward through Katanga to N.W. Zambia and western Tanzania. It appears to be divisable into reasonably well defined subspecies, based mainly on the characters of the female sex in each aggregate; the males being hardly distinguishable and variable on the underside.

### ***Charaxes etheocles*** (Cramer)

[*Papilio*] *etheocles* Cramer, 1777 : 34, pl. 119.
*Nymphalis etheocles* Cramer; Godart, 1823 : 355.
*Charaxes etheocles* (Cramer) Thon, 1837 : 74, pl. 37, figs. 547, 548 (♀).
*Charaxes etheocles* (Cramer); Butler, 1869 : 52.
*Charaxes alladinis* Butler; Kirby, 1871 : 269, n. 23 (♀).
*Charaxes etheocles* (Cramer); Trimen, 1891 : 80.
*Charaxes hollandi* Butler, 1893 : 266.
*Charaxes ephyra* ab. *catochrous* Staudinger, 1896 : 218.
*Charaxes etheocles* ♀ f. *regalis* Rothschild, 1900 : 486.
*Charaxes etheocles* ♀ f. *fulgens* Rothschild, 1900 : 487.

Only important relevant references are cited; for further references vide Rothschild & Jordan, 1900 : 481–482, and Bryk, 1939 : 375–542.

### ***Charaxes etheocles etheocles*** (Cramer)

(Pls. 6, 7; Text-fig. 1 [aedeagus])

REGION 1. W. AFRICA, SIERRA LEONE EAST TO CROSS RIVER, NIGERIA.

The type of the species is the female form *etheocles* (Cramer), described from Sierra Leone. No type specimen now exists, but the figure given by Cramer though not entirely satisfactory, must be taken as representing the white-barred female of Sierra Leone. (Pl. 7, figs. 55, 56. [Photo of original figure].)

FEMALE. Fore wing length 35–37 mm. margin of wing slightly incurved at 3–4. *Upperside.* Fore wing spots well separated and complete; a large spot in the cell; discal spots including a dot at base of 4 creamy to 2, larger marks in 1a–1b white, blue-tinged distally; postdiscal spots larger, ochre in colour, extending from subapex to 2; margin with faint indication of greyish marks, most obvious at tornus. Ground colour brownish black with blue tinge at base. Hind wing ground colour brownish black, blacker on border; discal band fairly narrow, almost straight on outer border, more irregular on inner, generally white with slight blue on inner border; tapering rapidly to inner border above anal angle where it crosses the inner fold as a partially separated mark. Submarginal series of linear whitish marks strong; marginal border strongly reddish to lower tail then olive to anal angle; margin black; tails moderately long, upper 6 mm. lower 5 mm., black with red midline.

*Underside.* Ground colour light brown, slightly more rusty on outer border of fore wing; basal black marks fairly strong; pattern of above well marked, white, slightly buffish in subapical area; submarginal ocelli weak except at tornus and area above where the marks are strongly black outlined distally in whitish. Hind wing ground colour slightly more rusty; basal black lines thin; discal white band well represented but narrower, broken towards inner border; postdiscal row of lunules weak in upper sector but stronger from mid point to anal angle; submarginal row of linear whitish marks strong; marginal border brick-red to lower tail then olive with black dots to anal angle.

*Variations.* (a) Generally similar to above, but *Upperside* spots and marks in fore wing slightly larger, spots from 2–5 slightly conjoined. Hind wing band slightly wider. *Underside.* Very similar to nominate form, basal fore wing spots and pattern slightly stronger; fore wing spots " rayed ". The figure of the type is intermediate between the two. (Pl. 7, fig. 60.)

*Variation.* (b) Basically similar to (a) but *Upperside* fore wing spots white and more strongly conjoined. Hind wing band wider, with slight blue distally on lower half. *Underside.* Basal black marks less strong, but white pattern strong and fusion of fore wing spots clearly indicated. (Pl. 7, fig. 63.)

*Variation.* (c) *Upperside.* Ground colour blacker; pattern of fore wing very similar to (b). *Underside.* Ground colour darker brownish, but pattern more contrasty and stronger; the submarginal dark spots in fore wing complete to subapex; the postdiscal row of lunules in hind wing stronger.

## ♀ form ***alladinis*** Butler, 1869 : 5

Fore wing length 40–42 mm. *Upperside.* Ground colour purplish blue-black, sometimes rather brownish black. Fore wing with bluish spot toward upper end of cell and a small whitish one beyond, blue spots sub-basal in 2 and 5 in discal line; a row of postdiscal spots, three in line in subapex bluish white or bluish, followed by a slightly larger blue spots in 4-1b. Margin with indistinct glaucous marks, strongest in 1b. Hind wing ground colour as fore, blue spots rather indistinct, one diffuse spot subcostal in discal line; spots in postdiscal line whitish at subcosta but bluish and almost obscured, slightly more whitish toward inner fold; submarginal row of linear whitish marks complete but not strong; marginal row of lunules reddish above upper tail then olive to hind angle which has two black dots; edge black; tails longish, slightly spatulate at end, 5–6 mm. lower 4–5 mm., more pointed at end.

*Underside.* Fore wing ground colour greyish brown, more brownish on the distal border; basal black lines moderately strong; discal and postdiscal spots of above strongly represented, greyish white, bolder, edged proximally in black; the double tornal spot black with pale surround, not very large. Hind wing ground colour more brownish, sub-base with a greyish irregular bar; discal band irregular and much broken at 5–6, but strong on inner fold; postdiscal series of olive and maroon lunules strong and extending from costa to above hind angle; submarginal row of linear whitish to lilac marks complete and accentuated with black marks opposite tails and double at anal angle. (Pl. 7, figs. 58, 59, 61, 62.)

*Variation.* In some specimens the upperside fore wing spots may all be blue and the postdiscal spots in the hind wing limited to the two upper ones only, the rest totally obscured.

### ♀ form ***fulgens*** Rothschild, 1900 : 487

Fore wing length 40 mm. *Upperside.* Ground colour deeper blue-black, slightly purplish toward base. Pattern as in *alladinis* but all spots of fore wing bolder and usually bluer; the marginal glaucous or greyish lunules more apparent. Hind wing with costal and postdiscal spots larger and more distinct, blue, often with a bronzy tint. *Underside.* Pattern as in *alladinis* but stronger and bolder, the fore wing postdiscal strongly supported distally by bold black marks in the submarginal zone, shaded with grey distally; there is also a large black mark in 1b–1a between discal and postdiscal spots. Hind wing pattern generally as in *alladinis* but much bolder, the postdiscal zigzag line of lunules heavily brownish distally; the submarginal linear lilac to whitish marks strong, followed by the clearer marginal border strongly reddish above upper tail and olive to anal angle with strong black dots at tails and double at anal angle. This form is a transition towards the next. (Pl. 6, figs. 53, 54 (Type).)

### ♀ form ***regalis*** Rothschild, 1900 : 486

Fore wing length 40 mm. *Upperside.* Ground colour black with blue sheen toward the base. Pattern very similar to *fulgens*, but those of the discal series strongly developed and reaching to the hind margin; the postdiscal spots often large, all spots except those in 1a–1b orange-ochre, the latter blue. Hind wing slightly darker in ground colour has a well marked blue band made up of six marks in the discal row and two in the postdiscal in the subcosta area. The submarginal row of linear bluish white marks strongly developed and separated from the marginal border by black; marginal border reddish to lower tail then olive to anal angle. Tails 6 and 5 mm. long, reddish, narrowly edged black. *Underside.* The basal area of fore wing greyish brown, with deeper brownish in the discal area and wing margin; the discal and postdiscal light spots strong; the submarginal black spots of tornus and one above strongly outlined distally in greyish. Hind wing ground colour browner than fore except at base; discal band distinct but rather interrupted in mid area; the postdiscal lunules, olive and maroon bold; the submarginal linear marks strong; marginal border reddish to lower tail then olive to anal angle. In some specimens the fore wing spots are not large and may be entirely blue or with a suggestion of bronzy red. The type specimen has exceptionally large spots. The pattern suggests a transition toward the "*etheocles*" pattern. (Pl. 6, figs. 51, 52.)

### ♂ form ***ephyra*** Godart, 1824 : 330 (355)
### = ♂ form ***hollandi*** Butler, 1893 : 266

Fore wing length 35 mm. *Upperside.* Ground colour black with little or no sheen. Subcostal blue spots variable, but usually one at end of cell, one beyond and one or two subapical. Marginal lunules greyish, small or vestigial. Hind wing ground colour black; submarginal whitish spots small or ill-defined; margin may be slightly greenish; extreme edge black with slight white fringe well separated between veins. There may be a suggestion of a wavy greenish line opposite the tail in the postdiscal zone, usually absent. *Underside.* Fore wing ground colour greyish brown with strong satiny bars, one through end of cell, a complete bar through the disc outlined proximally in black, followed by a less marked bar in the postdiscal line; border broadly satiny with a row of dark spots from apex to tornus, of increasing size, blackest at tornus. Basal black marks clear and white-edged. Hind wing ground colour as fore, crossed by a satiny bar in sub-base; a satiny bar through the disc outlined in black proximally; postdiscal olive and maroon lunules strong, outlined in black proximally; submarginal line of pale marks accentuated distally in region of tails with black; marginal border mostly olive with some reddish scales above upper tail. The underside thus has a variegated appearance. (Pl. 6, figs. 49, 50.)

### ♂ form ***carteri*** Butler, 1881 : 108

Very similar above to *ephyra* Godart but on underside rather variable, satiny bars less developed and on the whole less variegated and suffused over with a brownish or rusty purplish tint. There is much intergrading. (Pl. 6, figs. 47, 48.)

### ♂ form ***catochrous*** Staudinger, 1896 : 218

This form was described from Cameroon as an aberration of *ephyra*. When we wrote our paper on the *etheocles* complex (van Someren & Jackson, 1952) only one male specimen was known from the W. African zone, taken at Lagos, Nigeria. It is now known to occur in Ghana and Ivory Coast and in Liberia. This extension westward increases the range of overlap of this form with *ephyra* and *carteri*. The question thus arises were we justified in considering *catochrous* as a distinct species? Our action received support when in 1955 we bred a large family from a female which gave thirty-three males of the *catochrous* form and females similar to the parent. Two subsequent families also from " *catochrous* " females produced both *carpenteri* and *catochrous* females and male forms *ephyra* (*hollandi*) and *catochrous*. It is true that these families were from females captured at Katera, Uganda, within the range of *Ch. etheocles carpenteri* and not from Cameroon or W. Africa, nevertheless the *catochrous* males are indistinguishable from Cameroon specimens. I am thus of the opinion that *catochrous* must be considered merely a male form of *etheocles*.

Ghana and Ivory Coast specimens:

Fore wing length 35 mm. *Upperside*. Ground colour black; blue spots small, one at upper end of cell, one beyond and two in upper subapex slight whitish; marginal glaucous spots small; fringe narrowly white. Hind wing ground colour as fore; submarginal row of small whitish spots not strong; marginal border greenish. *Underside*. Basal area to discal bar silvery; fore wing bar not strong but proximally lined in black; distal portion of wing browner and post-discal pale spots not strong; margin of wing brownish. Hind wing silvery at basal half crossed by paler sub-basal satiny bar; discal white bar strong, bordered brownish, postdiscal line of olive and maroon lunules strong accentuated proximally in black; marginal border reddish above upper tail greenish to hind angle; submarginal lilac spots not very strong but with black dots at anal angle.

Range: The nominotypical *etheocles* ranges from Sierra Leone and Liberia to Ivory Coast, Ghana and Nigeria, where it merges eastward into a slightly different larger form in Cameroon, Moyen Congo, west of the Congo River. (Map 4).

## REGION 2. CAMEROON, CENTRAL AFRICAN REPUBLIC, MOYEN CONGO, WESTERN CONGO, KATANGA AND ?N. ANGOLA.

### ***Charaxes etheocles biinclinata* ssp. n.**

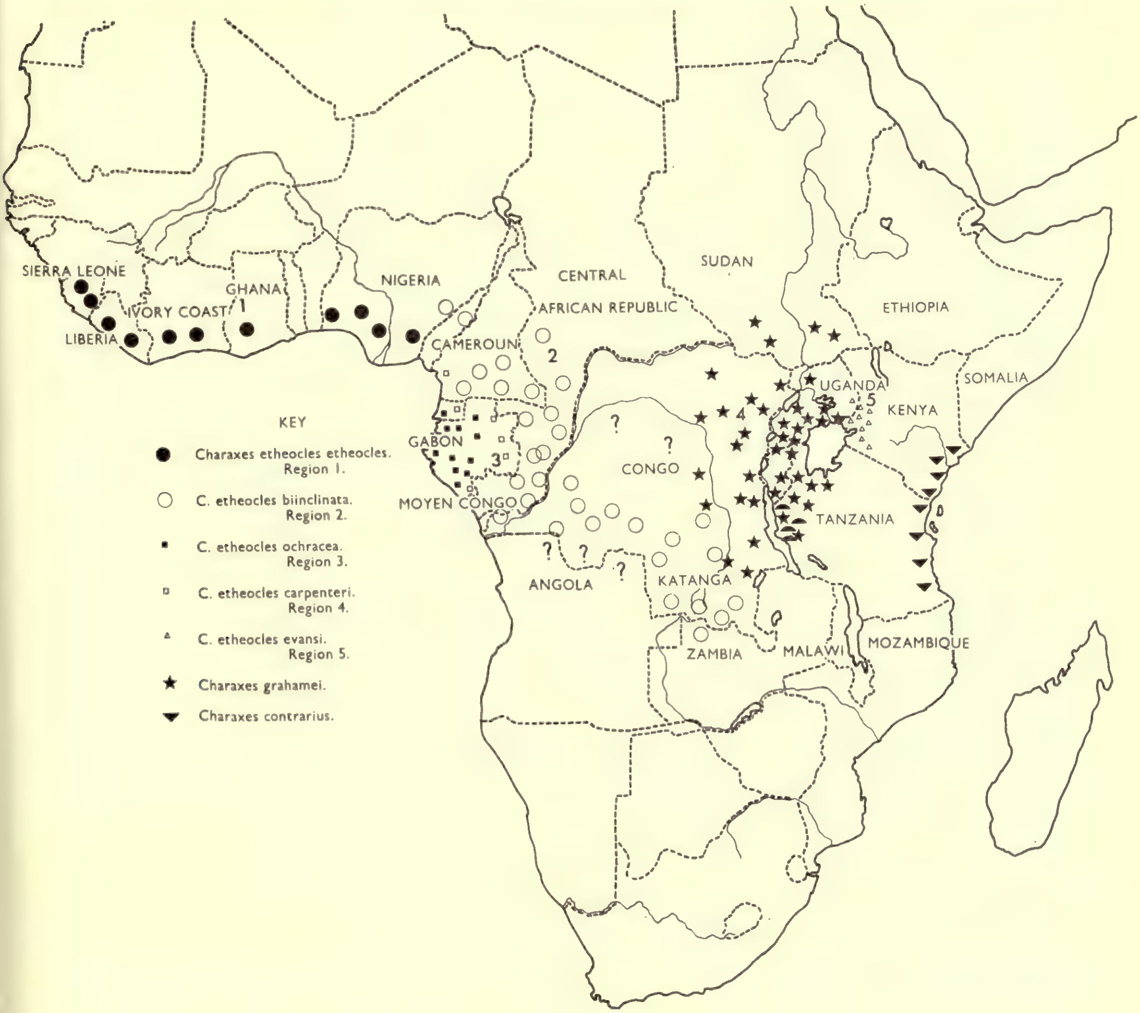
(Pl. 10, figs. 82, 83, 85–87, 89, Pl. 11, figs. 92, 93, 96, 97)

Type locality, Moyen Congo.

This is a mixed aggregate, occupying a very large area, and might be considered a " cline " between nominate *etheocles* of the western area and *ochracea* of the Gabon, lower Congo area, and it would appear to merge with *carpenteri* in the south-eastern Congo area. In this aggregate, the female forms resemble variations of the nominate race, *alladinis* and *regalis* and the majority of them are larger than those of the nominate *etheocles*.

### ♀ f. resembling *etheocles*

Fore wing length 42–44 mm. *Upperside*. Ground colour brownish black towards base, blacker on distal two-thirds of wing. Pattern of white spots bold, the spots being well separated, a rounded or triangular spot at upper end of cell, a larger ovoid spot at base of 4 set well in from the two upper spots of the discal line, spots of 3–1b of increasing size, that of 1a a streak; postdiscal series of spots complete from three in line in subapex, spot in 4 set well in, spots in 3–1b following the curve of the wing, spot in 1b touching the mark in discal line. All spots


SIERRA LEONE
LIBERIA
IVORY COAST
GHANA
1
NIGERIA
CENTRAL
AFRICAN REPUBLIC
SUDAN
ETHIOPIA
SOMALIA
CAMEROUN
2
GABON
3
MOYEN CONGO
CONGO
?
UGANDA
5
KENYA
4
TANZANIA
ANGOLA
KATANGA
ZAMBIA
MALAWI
MOZAMBIQUE
KEY
● Charaxes etheocles etheocles. Region 1.
○ C. etheocles biinclinata. Region 2.
▪ C. etheocles ochracea. Region 3.
▫ C. etheocles carpenteri. Region 4.
▵ C. etheocles evansi. Region 5.
★ Charaxes grahamei.
▼ Charaxes contrarius.

MAP 4.

creamy in colour. Margin with slight indication of greyish, separated by black at ends on veins. Hind wing ground colour brownish black at base, border wide and blacker; discal band whitish to creamy, of about equal width to 1c then tapering and crossing the inner fold, inner border slightly bluish. Submarginal elongate whitish marks distinct and well spaced; marginal border reddish orange above upper tail, then olive to anal angle. Tails long and slender 6–7 mm. upper, lower 5 mm., black with orange central line. *Underside.* Ground colour greyish brown, darker on the border of fore wing. Pattern bold, basal black marks strong. *Upperside.* Discal and postdiscal spots strongly represented; submarginal row of dark marks complete, strongly black at tornus and space above; a black mark also present in 1b. Hind wing basal area slightly darker brown with a satiny bar in sub-base; discal whitish bar strong, though less wide than above; postdiscal line of olive and maroon lunate marks strong; submarginal row of linear whitish marks strong; marginal border reddish to mid tails, then olive to anal angle. (Pl. 10, figs. 82, 86.)

Holotype female. MOYEN CONGO: Kelle, x.1962 (*Jackson*).

*Variation.* (a) Very similar to above. *Upperside.* Ground colour more strongly black; fore wing spots smaller, and ochre in colour. Hind wing band wide at costa but tapering rapidly the outer border incurved; submarginal linear marks more bluish. *Underside.* Ground colour more uniform greyish brown, satiny bars more diffuse; pattern of above, well-marked in discal line but less strong in postdiscal row, with the adjacent dark marks fading out above 1b. Hind wing discal band creamy white and distinct; the zigzag row of olive and maroon lunules strong; submarginal row of linear pale marks clear; marginal border reddish to upper tail, then olive to anal angle. (Pl. 10, fig. 85.)

*Variations.* (b) *Upperside.* General pattern of fore wing very similar to Pl. 10, fig. 82 but the spots are conjoined by rays. *Underside.* Ground colour more greyish; pattern of above well represented and showing raying for fore wing spots; marginal pale area divided by black veins. Hind wing ground colour more brownish and with a sub-basal satiny bar present but not strong discal creamy white band well represented; the postdiscal lunules not marked in upper half but strong thereafter to anal angle; submarginal whitish line broad but rather diffuse; marginal border reddish orange, outlined in ochre. (Pl. 10, figs. 83, 87.)

*Variations.* (c) *Upperside.* Fore wing ground colour brownish black with purplish tinge on basal area; distal border of wing more brownish. No spot in cell; spot in sub-base 4 very small; two upper spots in discal row quadrate, those in 3–2 crescentic, marks in 1b–1a increasing in size. Postdiscal spots large, of almost equal size, that in 1b in contact with mark in discal row. All spots orange-ochre except those in 1a, 1b discal row which are creamy. Hind wing ground colour as fore wing; the discal band rather irregular on borders, showing a tendency to raying on lower half of outer border, colour creamy with a tinge of purplish colour on inner border in 2–3. Submarginal linear marks creamy with a slight purplish surround; marginal border orange-red to lower tail, then olive to anal angle. *Underside.* Ground colour brownish grey with purplish flush over bases of both wings, more rufous on distal border of fore wing. The black marks at bases well developed, so also the black line on the proximal side of the discal ochreous spots; the postdiscal spots strongly ochreous; the postdiscal spots on fore wing only strong at tornus. Hind wing discal bar ochreous with some indication of breaking up toward the inner fold. Postdiscal lunate marks not strongly shown and suffused over by a rufescent bloom; submarginal pale marks strong; border reddish to lower tail then slightly olive to anal angle. (Pl. 10, fig. 89.)

This variation shows a strong tendency towards *ochracea* Rothschild of Gabon.

### ♀ form near ***regalis*** Rothschild.

Fore wing length 43 mm. *Upperside.* Ground colour black with some purplish brown towards the base; pattern of discal and postdiscal spots much smaller than in the nominate *regalis* type (q.v.), particularly in the discal row; all spots ochreous orange except those in 1a–1b which are blue. Hind wing ground colour blue-black, slightly browner at base; discal bar blue, not so strong as in nominate *regalis* especially as regards the two postdiscal spots at subcosta The submarginal row of linear marks bluish, not so pronounced; marginal border reddish to lower tail, but olive at anal angle. *Underside.* Ground colour brownish grey, slightly browner on outer border; black basal marks bold. Discal spots greyish, outlined in black proximally; postdiscal spots greyish white in 1b–3 then ochreous to apex; tornal spot and one above strongly black, the dark spots in spaces above hardly visible. Hind wing ground colour slightly browner, sub-base with paler bar; discal band whitish at costa, irregular and fading out at 2 to inner fold; olive and maroon lunules in postdiscal line rather large but not strong except opposite tails; submarginal row of linear marks rather diffuse, but narrowly outlined distally in black; marginal border not very clearcut but reddish to lower tail then olive to anal angle, which has two black dots.

In some examples, the fore wing spots are blue with little orange tinge. There is thus considerable difference between these specimens and nominate *regalis*, q.v.

### ♀ form near ***alladinis*** Butler

Very similar to form *alladinis* of the nominate race, but slightly larger; fore wing length 43–45 mm. *Upperside.* Ground colour purplish brown-black, slightly blacker on distal half of wing. Spot in cell and in discal line rather obscured, purplish blue; postdiscal spots more distinct and extending from subapex to 1b, upper ones whitish, lower purplish blue. Hind wing with two rather indistinct purplish blue marks subcostal in discal line; postdiscal spots indistinct and purplish blue; submarginal row of whitish linear marks distinct; marginal border reddish to upper tail then olive to anal angle. *Underside.* Ground colour rather dull, uniform greyish brown with rufescent bloom overall. Basal black marks thin; discal row of paler spots hardly visible except in subcosta but outlined proximally in black; postdiscal marks more distinct; tornal black mark distinct. Hind wing almost uniform with only slight indication of discal and postdiscal spots; submarginal row of linear white marks distinct.

The males associated with this aggregate are of two forms which differ mainly on underside characters. They are f. *ephyra*, *carteri* and f. *catochrous*.

The male forms are *ephyra* and *carteri*.

These three forms are hardly separable and have been referred to when dealing with the nominate race.

*Upperside.* Ground colour deep velvety black with an overall blue-green sheen, most pronounced over the disc of the hind wing. Length of fore wing, 33–35 mm. The number of subcostal blue spots variable, there is usually one at the upper part of end of cell, a larger one at the discal line, and sometimes one or two in the subapical area, but these may be absent. Margin with varying degree of glaucous marks. Hind wing sometimes with a trace of a wavy greenish line in the lower postdiscal zone opposite the tails, but more often this is absent; submarginal row of white dots with lilac surround complete; marginal border greenish; edge black, with very slight white fringe between veins. Tails short, rather thin, of about equal length, 3–4 mm. *Underside.* Ground colour rather dark earthy grey-brown with slight purplish flush. A satiny bar present in the discal line, and a satiny V at apex. Basal black dots and lines usually strong and outlined in white; submarginal row of dark subdued marks complete, those at tornus and space above black; margin with dark marks at end of veins. Hind wing ground colour slightly darker than fore, with a strong satiny bar in sub-base, and a stronger one through the disc, rather irregular at lower end but represented at the inner fold by a somewhat triangular whitish mark; postdiscal row of olive and maroon lunules strong, outlined proximally in black; submarginal row of linear white marks clear; marginal border dull greenish with some admixture of red above upper tail then olive to anal angle; usual double black spot at anal angle, and near bases of tails. (Pl. 11, figs. 92, 96.)

### ♂ form **catochrous** Staudinger

*Upperside.* Ground colour deep velvety black; fore wing subcostal spots variable in size and number, sometimes absent; marginal glaucous marks small and often hardly visible. Hind wing submarginal spots small, bluish or obscured; marginal border narrow, greenish, plainly visible or obscured, olive at anal angle. *Underside.* Pattern essentially as in other forms but bolder, the basal half of the wings silvery to the discal lines, the distal half of the wings brownish; satiny bars strong. In some specimens the contrast is less strong. (Pl. 11, figs. 93, 97.)

Range: south-eastern Nigeria and Cameroon, the Central African Republic and Moyen Congo to the Lower Congo, Kasai and Katanga, where it appears to meet *etheocles carpenteri*. (Map 4).

## REGION 3. GABON AND ADJOINING TERRITORY, LEOPOLD AREA, LOWER CONGO

### ***Charaxes etheocles ochracea*** van Someren & Jackson, 1957

f. *violacea* Rothschild, 1900 : 485.
f. *ochracea* Rothschild, 1900 : 486.

This subspecies is concentrated in a comparatively small area of the total distribution of the species. The female forms of this aggregate exhibit a common character, that of strong purplish admixture with the blackish brown of the ground colour, and that the pattern of spots on fore and hind wing are predominantly ochre-yellow to orange. The first name to be applied to any one of this aggregate was *ochracea* Rothschild, 1900 : 486. We adopted this name to represent the subspecies.

The males associated with this aggregate were named *violacea* Rothschild, 1900, the type coming from Ogowe River, Gabon. It was described as having the upper side violet-blue, but the degree of violet sheen is not constant.

Fore wing length 35 mm. Shape slightly variable in regard to the incurvature on the outer border of the fore wing. *Upperside.* Ground colour deep velvety black; fore wing blue spots variable in size and number, from immaculate to one very small subcostal spot or three visible marks. Marginal marks hardly visible except at hind angle. Hind wing with submarginal series of white to lilac spots small, clearly marked; edge with slight white fringe. *Underside.* Clayish grey-brown at basal half, more brownish with a slight purplish flush beyond; basal marks strong, often heavy; satiny bars not strong; submarginal dark marks strong at tornus and space above. Hind wing basal area as fore wing up to discal line; greyish brown, darker on postdiscal zone where the series of lunate olive and maroon marks are strong; submarginal row of whitish lilac marks strong; marginal border reddish to upper tail, then olive to anal angle.

Lambarene males are colder in tone on the underside. (Pl. 10, figs. 84, 88.)

The females are extremely variable as regards pattern on the upper side.

### ♀ form **ochracea** Rothschild 1900 : 486

Fore wing length 40–44 mm. (type, 40 mm.) *Upperside.* Ground colour brownish black with a strong purplish tone. Pattern bold; in the discal row there is a large subcostal spot with a slightly smaller one below, the spot at base of 4 is set well in, subsequent marks of increasing size, somewhat angular, mark on 1a, a streak; postdiscal spots large, three subapical in a row, elongate; spot in 4 set in a little, those of 3-1b larger, than in 1b touching the discal mark in same area. All spots ochreous or orange-ochre, those in 1a–1b slighter paler. Margin of wing with large but diffuse marks, most visible at tornus. Hind wing ground colour as fore, slightly darker on border. Discal band complete, wide at costa and gradually tapering toward the inner fold, colour buffish ochreous with slight purplish tinge to borders; marginal border orange to lower tail then olive to anal angle. *Underside.* Rufous brown strongly flushed with purplish especially at bases of wings. Basal black marks in fore wing well marked, but those of hind wing fine. The discal and postdiscal rows of spots buffish and clearly defined in the discal row, but less clear and ochreous in postdiscal; tornal black mark small, double; with inner black mark in same area distinct. Hind wing discal band buffish, rather irregular toward inner fold, represented at the fold by a triangular pale mark. Postdiscal row of reddish buff lunules pale at upper end but strong toward lower half; submarginal row of linear marks strong; marginal border orange red then olive at anal angle. Tails 6 and 5 mm. long. (Pl. 11, figs. 91, 95.)

*Variation.* (a) *Upperside.* Fore wing spots are large and slightly joined by rays, spots ochreous; marginal marks large and diffuse. Hind wing band ochreous, the outer border irregular and somewhat dentate. Otherwise very similar to type.

*Variation.* (b) *Upperside.* Fore wing spots are smaller, less strongly orange-ochre, the marks in 1a–1b whitish tinged with purplish. The hind wing band narrower and more tapering, whitish, flushed with purplish on outer border. *Underside.* More rufous with purplish flush; the pattern of both wings strong in the discal lines.

*Variation.* (c) *Upperside.* Fore wing spots are large, whitish and buffish tinged with violet in 1b–1b; the hind wing band off-white with strong purplish buff suffusion on outer border which is rather diffuse. *Underside.* Ground colour is darker in the basal areas of both wings, but more greyish on outer half beyond the discal line in fore wing with the postdiscal series of spots not so distinct. The postdiscal row of lunules in the hind wing strong in the lower half.

*Variation.* (d) Ground colour and pattern as in type *ochracea* but all marks in fore and hind wing strongly ochreous. ♀ f. *ochreata* van Someren & Jackson, 1957.

## ♀ form ***seriata*** Rothschild, 1900 : 487.

Fore wing length 40 mm. *Upperside.* Ground colour darker than in previously mentioned forms of *ochracea* being brownish black with a strong purplish tone. Discal spots represented by one large at subcosta with a small dot below, marks in 3–2 almost obliterated; postdiscal spots complete and large though not sharply defined, three subapical in line, spots from 4 to 1b increasing in size; all spots ochreous, marginal lunules large but indistinct. Hind wing ground colour as fore, slightly darker in disc; no discal spots, but postdiscal series of indistinct marks are visible; submarginal linear marks strong and buffish white; marginal border strongly developed, orange-red to lower tail, then olive at anal angle; extreme edge black, tails long and slender, upper 6 mm., lower 4 mm., black with central orange streak. *Underside.* Ground colour grey-brown strongly rufescent with a purplish brown flush, especially on the hind wing, border of fore wing more rusty; basal black lines in fore wing strong, but spots in discal line represented by upper ones only; those of the postdiscal series complete but rather suffused over; the tornal black mark moderately strong, accentuated by whitish surround. Hind wing pattern rather suffused over, but sub-basal and discal pale bars visible; the postdiscal line of lunules fairly distinct strongest at lower half; submarginal series of linear marks buffish and well developed, margin reddish to lower tail, olive to anal angle. (Pl. 11, figs. 90, 94.)

*Variation.* (a) *Upperside.* Resembling somewhat nominate *seriata* but fore wing postdiscal spots smaller. No suggestion of postdiscal spots in the hind wing. Underside generally darker than in *seriata*.

*Variation.* (b) *Upperside.* Somewhat like (a) but ground colour stronger, more purplish brownish black, the margin of the wing more rusty. The discal spots in fore wing limited to one large subcostal and a dot below, buffish ochre in colour; postdiscal spots large and ochreous complete to 1b, marginal lunules large but diffuse but distinct in 1b. Hind wing without, or with a very faintly indicated row of postdiscal spots in the hind wing; submarginal linear marks bold, buffish in colour; marginal border strong. Underside with black basal marks in fore wing strong to discal line; rest of pattern partially obliterated by rufous purplish tone to outer border; hind wing pattern rather subdued, but with a darker zone in the discal line, the postdiscal lunules though large, rather hazy in upper half but clearer toward lower end; the submarginal row of linear marks, strong and buffish in colour; marginal border broad, orange-ochre to lower tail, and olive at anal angle.

*Variation.* (c) This variation links the *seriata* group with *ochracea*. *Upperside.* Ground colour purplish brown, rather more rusty on the border of fore wing. The discal spots are well developed and clear to 2, slightly indicated in 1b, whitish or cream in colour; the postdiscal series large and whitish buff extending from subapex to 1a; margin with large, rather diffuse buffish marks contiguous with postdiscal spots. Hind wing ground colour darker in the disc, more blackish, no discal marks, but postdiscal series of spots well defined, buffish white in upper part but ochreous with purplish brown tinge in lower part to above anal angle. Submarginal linear buffish marks strong; marginal border orange-red to lower tail, then olive at anal angle. *Underside.* Ground colour purplish brown, more rusty on outer border with pale margin. Discal buffy spots distinct, but those of the postdiscal row becoming rather faint toward the subapex; tornal black mark double but small. Hind wing pattern rather overshadowed by the overall purplish brown tone; the postdiscal lunules also subdued by the rusty ground; the submarginal linear ochreous marks suffused over in upper half; marginal border orange-red to lower tail, olive at anal angle.

Range: Restricted mainly to the forest areas of Gabon, with a slight extension into Leopold area of S. Congo and northward into the southern corner of Cameroon. There appears to be some intergrading with *biinclinata* in the southern part of the Moyen Congo. (Map 4).

## REGION 4. S.W. OF CONGO BASIN, KATANGA, N.W. RHODESIA, UGANDA, S. SUDAN AND ADJOINING AREA OF ETHIOPIA, N.W. TANZANIA

### ***Charaxes etheocles carpenteri*** van Someren & Jackson, 1957 : 54.

(Text-figs. 2–4 [Aedeagus])

The eastern aggregate of *ethocles* was recognized as a subspecies by van Someren & Jackson (1957 : 54). We selected as type, the eastern representative of form *alladinis*, to which Poulton had given the name *carpenteri* in 1918, this being the first name to be applied to any member of this aggregate. This form is unfortunately highly variable. The type was taken at Kakindu Hill, south of the Kagera River, in the Bukoba district of Tanzania.

MALES. Although we designated *violacea* Rothschild as the male of this race (van Someren & Jackson, 1957 : 54) this was an error! Form *violacea* Rothschild is now restricted as the male of *etheocles ochracea* of the Gabon area. In our previous paper (1952), we considered that the male form *catochrous* Staudinger with a strong silvery basal area to both wings was the male of a distinct species with only one form of female. This also has been shown to be incorrect. We are confronted with the fact that though all these males resemble each other on the upper surface, within minor limits, the underside may be brownish as in *carteri*, or silvery in the basal areas as in *catochrous*, and there are many intermediates. They can be bred in the same family. We however designated a male from Mabira Forest, Uganda, as male of *carpenteri* 1957 : 54.

## ♂ form **carpenteri** van Someren & Jackson, 1957 : 54.

Fore wing length, average, 35 mm. Outer border of wing slightly concave at 3–4. *Upperside.* Ground colour velvety black (may be tinged brownish in very old specimens). Little or no indication of glaucous marks on margin; no blue subcostal spots, or there may be very small dots, one at upper end of cell, a minute dot beyond in discal line, and one or two in subapex. Hind wing ground colour as fore, submarginal whitish spots may be small and distinct or somewhat obscured; marginal border narrow and greenish throughout, or with some olive at anal angle. *Underside.* Ground colour brownish drab, darker brownish on outer border, satiny bars strong, a quadrate mark in cell and a broad satiny bar through the discal zone, outlined proximally in 1b–3 in black, a satiny V mark at apex; basal black lines fine to moderate; submarginal dark marks black at tornus decreasing in size and colour to subapex, slightly ringed in greyish. Hind wing ground colour as fore slightly darker in basal half crossed by a paler satiny bar, a stronger satiny bar through the disc outlined proximally in black; postdiscal zone browner, with postdiscal olive and maroon lunules strongly indicated, finely outlined in black proximally; submarginal pale line irregular and faintly indicated; marginal border reddish to upper tail then olive to anal angle with black dots between tails, double at anal angle. Tails short, somewhat stumpy, 4 and 3 mm.

*Variation.* (a) *Upperside.* Fore wing margin with distinct glaucous lunules. Submarginal white spot and border distinct. *Underside.* The whole more uniform greyish brown, slightly browner on the border of fore wing and on disc of hind wing; satiny bars more diffuse so that in side light the whole surface has a glazed appearance, but the black marks may be strong. The postdiscal line of wavy lunules almost obscured except toward the anal angle, the submarginal linear pale marks complete but indistinct; but the marginal reddish and olive border is strong. (Pl. 8, fig. 69.)

*Variation.* (b) *Upperside.* Differs little from the nominate, except that the fore wing subcostal spot in discal line is distinct, the postdiscal a mere dot. *Underside.* Pattern is however, strong and in side light the satiny bars show up strongly as they do in the nominate, suggestive of an intermediate stage towards f. *catochrous.*

## ♀ form **carpenteri** Poulton, 1918 : lxxxii

Fore wing length 43 mm. *Upperside.* Ground colour of fore wing brownish black at base, blacker on the distal half, with a slight purplish sheen. Pattern not strongly marked, in the discal line are two spots, upper one whitish and large, lower small, no spot in 4, spots in 3–2 whitish, rest greenish blue. Submarginal linear white marks well developed; marginal border two whitish, spot in 4 set in, that in 3 slightly in, that in 2 slightly out and crescentic in shape, spots in 1a–1b purplish blue. Margin with diffuse glaucous lunules. Hind wing ground colour black with strong greenish blue sheen in disc. No discal marks; but postdiscal spots extending from costa in an irregular line to short of the inner fold where there is a pale mark, upper spots whitish, rest greenish blue. Submarginal linear white marks well developed; marginal border a mixture of greenish and orange scales to lower tail then olive to anal angle. Tails longish, thin, 7 and 5 mm. *Underside.* Ground colour greyish brown with slight rufous bloom; satiny bars slight in discal zone, slightly stronger in postdiscal line; basal black marks thin; tornal mark and one above black, with black marks more proximal in same spaces, with white mark in between. Hind wing ground colour as fore, basal black marks very thin; satiny bars very faint, only visible in side light; postdiscal line of lunate marks rather angled in upper part and not strong, but more marked toward the inner fold above the anal angle. Submarginal linear buffish marks present but rather weak; marginal border orange-red to between tails, then olive to anal angle.

*Variation.* (a) *Upperside.* Very similar to the type but fore wing spots smaller and limited in the discal line; those of the postdiscal series extending to 1a; hind wing with postdiscal series of greenish spots clear in upper part but obscured in lower. A faint indication of a spot in discal line at costa. (Pl. 9, fig. 75.)

*Variation.* (b) *Upperside.* Discal spots well represented with an extra dot at sub-base of 4, the upper spots bluish, those faintly indicated in 1b and 2 deeper blue to purplish; the postdiscal series complete, double in 1b and a trace of spots in 1a, upper marks bluish white, lower stronger blue. Hind wing with complete row of postdiscal spots and a faint indication of marks in upper discal line; submarginal linear marks strong. *Underside.* As in (a) as regards ground colour, but basal black marks stronger; pattern of upperside more clearly represented. The hind wing with rusty flush overall rather obliterating the pattern except at lower end of postdiscal line. (Pl. 9, fig. 73.)

*Variation.* (c) *Upperside.* Very like (b) but mid-discal spots larger and white; postdiscal spots complete to 1b, bluish. Hind wing with a trace of a spot in discal line at costa, the postdiscal spots complete to 1b, large spot in upper end, bluish. *Underside.* Darker greyish brown especially over hind wing, the fore wing pattern stronger, but hind wing pattern subdued except for the postdiscal lunules which are strong except at upper end.

*Variation.* (d) *Upperside.* An interesting variation in which there is a large blue spot in upper part at end of cell; the discal spots large with an extra spot at sub-base 4, all these spots white, an obscured blue mark in 1b; postdiscal spots small and bluish, the mark in 1b elongate and set out toward tornus. Marginal glaucous marks more distinct. Hind wing with an indication of a blue spot at costa in discal line; postdiscal spots very faint except the second upper one which is white. *Underside.* Ground colour as in (c) but pattern stronger in fore wing with postdiscal spots large and more distinct in the browner outer border. The hind wing ground colour darker, with a satiny sub-basal bar and the discal and postdiscal lines of spots distinct.

The enlarged white discal spots of the fore wing in conjunction with the strong underside pattern seem to indicate an element of the pattern of female form *pallidimacula* in the genetical make-up of this specimen. (Pl. 8, fig. 72.)

*Variation.* (e) Though very battered as a result of being caged for eggs, this specimen exhibits some interesting and unusual features. *Upperside.* Ground colour though brownish black, has a strong greenish tinge over the base of the fore wing and the disc of the hind wing. The fore wing discal spots though comparatively large are greenish blue and subdued; the postdiscal marks are also subdued and large extending from subapex in increasing size to the streak in the hind margin. The hind wing has a much broader postdiscal band than usual made up of large greenish blue marks indented on the outer ends; the submarginal line of whitish marks and the marginal border as usual. *Underside.* As in usual *carpenteri.* (Pl. 9, fig. 74.)

*Variation.* (f) *Upperside.* Fore wing somewhat similar to (e) but postdiscal series of spots more obscured and beyond these a series of blackish marks. Hind wing as in (e) but without any definite postdiscal band, this area being broadly greenish blue. The underside is almost identical to that of (e).

## Variations in the females with " *etheocles* " pattern.

### ♀ form ***pallidimacula*** van Someren & Jackson, 1957 : 54

Fore wing length 40–42 mm. *Upperside.* Ground colour brownish black, blacker on distal half of wing. Pattern generally similar to that of *etheocles etheocles* but distal and post discal spots white as in the type or very slightly creamy-tinged. A large spot at upper end of cell, two large subcostal spots beyond in discal line, a spot at sub-base 4, set well in, spots from 3 to hind margin of increasing size, that in 1a, a streak. Postdiscal series, three in an oblique line in subapex, spot in 4 set in at an angle, spots from 3 to 1b increasing slightly in size, spot in 1b merging with discal mark. Margin without distinct pale marks except at tornus in 1b. Hind wing with a broad white band of about equal width from costa to cell area then tapering to above anal angle and crossing the inner fold, borders slightly shaded with blue, mostly opposite tails; submarginal row of linear marks white and strongly developed; marginal border reddish to upper tail then olive to anal angle; tails moderately long, 7 and 5 mm., upper with rounded end, lower pointed. *Underside.* Ground colour greyish brown, slightly darker in interspaces; black line in basal area fine; pattern of above showing up strongly; tornal black marks and smaller one in space above, strong. Hind wing basal area with very fine black lines; discal white bar strong but narrower than above and restricted on the inner border; postdiscal line of lunules, olive and brownish, weak at costa but strong to above anal angle; submarginal linear marks whitish, rather dyslegnic; marginal border reddish to upper tail then olive to anal angle; black dots present at bases of tails, double at anal angle. (Pl. 8, figs. 64, 65.)

*Variation.* (a) *Upperside.* Generally similar to nominate but fore wing spots in discal row slightly larger, the spot in 1b not in contact with that of postdiscal row, spotmark in 1a, a long streak, extended distally. All fore wing spots white. Hind wing discal bar narrower, straighter on the outer border and with very little bluish on inner border. *Underside.* Ground colour paler, but pattern essentially similar.

*Variation.* (b) *Upperside.* Ground colour as in (a); no spot in the fore wing cell; all spots creamy. Hind wing bar strongly bluish with white line in upper discal area. *Underside.* Ground colour rather paler, but pattern clear; hind wing discal band restricted to discal zone. One of many similar specimens bred in family containing f. *carpenteri.* (Pl. 8, fig. 71.)

*Variation.* (c) *Upperside.* Fore wing ground colour brownish black, slightly darker on border. Fore wing discal spots larger slightly conjoined, that in 1b–1a extended distad to postdiscal line, and extended on the proximal side where they are pale bluish; postdiscal spots elongate ovoid; a minute dot in the cell; all marks creamy ochreous. Hind wing band wide slightly restricted at costal end, the band is widest at and extends over the cell area where it is strongly shaded with blue, submarginal linear marks thin; border rather darker maroon above upper tail but olive at anal angle. *Underside.* Ground colour as in previous form but rather rusty on outer border of fore wing, satiny sheen overall; hind wing with darker band proximal to discal white band and in zone carrying the postdiscal olive-ochre and olive lunules which are strong, submarginal row of linear marks strong and border well developed but narrow. (Pl. 8, fig. 66.)

*Variation.* (d) *Upperside.* Ground colour as above, slightly darker on border which has indication of large dark spots; edge with pale marks from tornus to 4. Large spot in cell of fore wing, discal and postdiscal spots large, slightly rayed or conjoined, all marks ochreous. Hind wing blacker on border; discal band wide at costa, tapering to above anal angle and crossiug inner fold, creamy white with bluish on inner border. *Underside.* Ground colour as previous form, pattern stronger, fore wing marks creamy; hind wing with brownish zone proximal to discal white band; rest of pattern strong.

There are many intermediates between these variations.

### ♂ form **catochrous** Staudinger, 1896 : 218

*Upperside.* Closely resembles the other forms; the subcostal blue spots of the fore wing may be small yet visible, one in upper part of cell, one in the discal line and two in the subapex, or they may all be wanting. The margin may be without marks or there may be small white marks. On the hind wing the submarginal row of white marks may be punctiform or short linear. *Underside.* Presents a rather striking appearance, the basal two thirds of both wings are a silvery greyish white in which the dark marks show up clearly, in addition, the satiny bars are well developed. The distal third of the fore wing beyond the discal zone is browner and in this the submarginal spots, black at the tornus extend up to the subapex, are ringed in whitish and accentuated proximally in black. On the hind wing the satiny bar in sub-base and that of the discal line show up strongly and in the darker border the postdiscal series of olive and maroon lunules are strong; the submarginal linear white line is sharply defined to above the anal angle; the marginal border, though narrow is red to upper tail then olive to anal angle with black dots between tails double at anal angle. (Pl. 8, figs. 67, 68.)

The underside pattern of all these forms is essentially the same, and though the two extremes look different, both forms and transitionals often occur in one bred family.

Range: The range of this subspecies is from the border of N.W. Kenya with Uganda, from Kakamega-Kabras to Busia in eastern Uganda, westward to the eastern side of the Congo Basin, south to Katanga and the north-eastern side of Tanzania. There is some apparent contact with *biinclinata* in the Kasai-Katanga area. (Map 4).

## REGION 5. N.E. KENYA AND EASTERN AREAS OF MT. ELGON, TRANSNZOIA TO MAU, LUMBWA, LONDIANI, SOTIK-MARA, LEMBUS AND RAVINE

### ***Charaxes etheocles evansi*** van Someren & Jackson

(Pl. 9, figs. 76–81, Text-figs. 5–6 [aedeagus])

*Charaxes etheocles* ♀ form *evansi* van Someren & Rogers, 1932.
*Charaxes etheocles evansi* van Someren & Jackson, 1957 : 54.

MALE. *Variation.* (a) Fore wing length 35–36 mm. sometimes smaller. Shape, apex rather pointed, in fore wing. *Upperside.* Ground colour velvety black, slightly tinged brown at base in some examples. Blue spots along subcosta variable, may be minute or strongly represented; marginal glaucous marks hardly visible or may be small but strong at tornus. Hind wing ground colour black; submarginal row of white marks usually distinct; marginal border may be mostly greenish or reddish to upper tail then olive to anal angle. Tails short almost stumpy, of about equal length, 4 mm. *Underside.* The ground colour and strength varies in the same way as we have noted in the females (a). It may be greyish brown, slightly browner in the curve of the fore wing and over the discal portion of the hind wing. Satiny bar of the fore wing moderately strong; basal black marks fine, black lines in interspaces on hind half graduated from heavy in 1b to fine; submarginal dark marks heavy at tornus and space above. Hind wing ground colour as fore wing, satiny sub-basal bar strong; that through the disc strong in upper portion, rather broken in lower; postdiscal olive and maroon lunules strong; submarginal pale line obscured in upper part but clear in lower; marginal border narrowly red above upper tail, olive to anal angle, between row of black marks strong.

*Variation.* (b) *Upperside.* With minute blue marks in subcostal area of fore wing; no marginal spots. *Underside.* Ground colour darker grey brown, with richer brown in interspaces and on the outer border of the fore wing; the satiny bars showing up more strongly in the discal line and inner submargin and at apex. Hind wing with correspondingly strong satiny bars and a darker zone in the postdiscal line.

These variations can be present in one family.

FEMALE. Fore wing length 40–42 mm.; shape slightly more pointed, as a rule, than *etheocles carpenteri*. *Upperside.* Ground colour deep brownish black, rather browner at base of wing. Fore wing pattern strong; a suggestion of a spot toward upper end of cell; subcostal spots in discal line in 6–5 one above the other, spot in 4 set well in, that in 2 slightly out, spots increasing in size to hind margin, that in 1a a streak extending distad. Postdiscal series, three subapical in an oblique line, spot in 4 set well in, that in 3 slightly in, that in 2 slightly out, with a double spot in 1b set in a little, the two rows completely separate and strongly orange-yellow. No marginal marks. Hind wing basal area brownish black, but border blacker and in between a white discal band widest at costa and gradually tapering to above anal angle but not crossing the inner fold, though there represented by a greyish mark borders suffused with greenish blue particularly on the outer border; submarginal row of linear white marks complete; marginal border reddish to upper tail then olive to anal angle. *Underside.* Ground colour pale brownish grey, more brownish between the two rows of spots representing the upperside pattern, and rusty in the curve of the wing. The basal black marks are fine; the discal and postdiscal spots buffy to ochreous; the spot between the two rows in 1b, black, so also the tornal marks in 1b and space above. There is an overall sheen to the wings. Hind wing ground colour tinged more brownish over the disc; satiny bars present at sub-base; the discal band well represented and white in colour; the postdiscal lunules not strong except in the lower part in the area of the tails where it is greenish olive; the submarginal linear marks fairly strong; the marginal border reddish to upper tail then olive to anal angle.

The whole underside has a rather cold greyish tone. (Pl. 9, figs. 76, 77.)

*Variation.* (a) *Upperside.* Colour and pattern very similar to the nominate form but the fore wing spots slightly larger, those of the discal row large and extended distad so as to almost make contact with the postdiscal spots in the same spaces, 1b–1a, all the spots deep ochreous. Hind wing discal band slightly narrower, bluish on borders; submarginal row of linear white marks tending to fade out opposite tails; marginal border more strongly marked. *Underside.* Much as in nominate form but with the exception of the brownish to rusty border to fore wing, the whole underside of a colder tone with a satiny sheen overall. The pattern of spots whitish to creamy. The hind wing rather browner at base which is crossed by a narrow satiny bar; the outer border of the wing widely satiny. The discal band narrower, the postdiscal row of lunules complete but obscurely represented in the brownish ground; submarginal line of pale marks rather obscured by satiny sheen; marginal border broad and well marked.

*Variation.* (b) *Upperside.* Ground colour of fore wing as in (a); series of discal and postdiscal spots small and widely separated most noticable in areas 1a–1b. Postdiscal spots small and ill defined. All spots deep ochreous. Hind wing white bar narrow throughout but going through to inner fold; submarginal linear white marks strong. *Underside.* Darker in ground colour especially on the distal half of the wings, the discal band of fore and hind wing whitish and in strong contrast, but the postdiscal spots of fore wing less strongly marked.

*Variation.* (c) *Upperside.* Ground colour of fore wing brownish black at base but strongly suffused over with rufous red on the distal half especially on the border. Discal and postdiscal spots as in (a) strongly orange with very narrow rays joining the two series. Hind wing ground colour brownish black, greyer on the inner fold; discal band comparatively narrow, white with greenish blue on both borders; submarginal linear white marks strong; marginal border narrow but strongly orange red above upper tail, olive to anal angle. *Underside.* The whole surface flushed over with rusty colour especially on border of fore wing and over the hind wing; fore wing discal band ochre, the postdiscal spots orange rather suffused over by the rusty bloom. The tornal black spot and one between spots in 1b strongly black. Hind wing slightly more greyish on distal border, the discal band rusty orange; the postdiscal lunules rusty brown with slight greenish proximally; the submarginal row of linear marks though strong are partially obscured; marginal border narrow but distinctly reddish to upper tail then olive to anal angle.

### ♀ form ***conjuncta*** van Someren & Jackson

*Upperside.* Fore wing ground colour as in form (c) slightly more rusty red on border; discal and postdiscal spots orange, completely joined by rusty rays. Hind wing discal band mostly white with faint bluish on borders; submarginal and border as in (c). *Underside.* Rusty suffusion overall; fore wing conjoined marks dull orange, white in 1b. Tornal black marks strong. Hind wing discal band tapering rapidly; dull ochreous. Submarginal and marginal ornamentation bold. (Pl. 9, fig. 78.)

Range: The distribution of *etheocles evansi* is limited to the high country west of the Rift Valley, centred mostly around Mt. Elgon and TransNzoia, but also occurs at Nandi, Lumbwa, Londiani, Mau, Cherangani to Ravine and Tembach. It thus overlaps some of the territory of *Charaxes berkeleyi* ssp. and also that of *Charaxes baileyi.* (Map 4).

## SYSTEMATIC LIST

### ***Charaxes etheocles etheocles*** (Cramer)

*Charaxes etheocles etheocles* (Cramer) 1777. Type locality, Sierra Leone.
Region 1. ♀ f. *etheocles* & vars.
*alladinis* Butler, 1869. Type locality, Ghana.
*fulgens* Rothschild, 1900.
*regalis* Rothschild, 1900. Type locality, Sierra Leone.
♂ f. *ephyra* Godart, 1823. " West Africa ".
*hollandi* Butler, 1893. Type locality, Sierra Leone.
*carteri* Butler, 1881. Type locality, Accra.
*catochrous* Staudinger, 1896. Cameroon.
Range: West Africa, Sierra Leone east to Cross River, Nigeria.

### ***Charaxes etheocles biinclinata*** ssp. n.

*etheocles biinclinata* ssp. n. Type locality, Moyen Congo.
Region 2. ♀ f. *etheocles* pattern (two vars.).
*ochracea* pattern.
*alladinis* pattern.
*regalis* pattern.
♂ *hollandi* pattern.
*carteri* pattern.
*catochrous* pattern.
Range: Cameroon, Central African Republic, Moyen Congo, western Congo, ?northern Angola, Katanga.

### ***Charaxes etheocles ochracea*** van Someren & Jackson.

*etheocles ochracea* van Someren & Jackson, 1957. Type locality, Gabon.
(*etheocles* f. *ochracea* Rothschild.)
Region 3. ♀ f. *ochracea* Rothschild, 1900. Type locality, Gabon.
*ochreata* van Someren & Jackson 1957. Type locality, Gabon.
*alladinis* × *regalis*.
*seriata* Rothschild, 1900. Type locality, Gabon.
♂ f. *violacea* Rothschild, 1900. Type locality, Ogowe Riv., Gabon.
Range: Gabon and adjoining territory Leopold area, lower Congo.

### ***Charaxes etheocles carpenteri*** van Someren & Jackson

*etheocles carpenteri* van Someren & Jackson, 1957. Type locality, Kakindu Hill, Kagera, Tanzania.
(*etheocles* f. *carpenteri* Poulton, 1919)

Region 4. ♀ f. *carpenteri* Poulton, 1919 et vars.
*pallidimacula* van Someren & Jackson 1957, et vars. Type locality, Jinja, Uganda.
♂ f. *carpenteri* van Someren & Jackson.
vars. nr. *carteri* Butler.
nr. *catochrous* Staudinger and intermediates.

Range: S.W. of Congo Basin, Katanga and N.W. Rhodesia; Uganda, South Sudan, adjoining area Ethiopia, N.W. Tanzania.

### ***Charaxes etheocles evansi*** van Someren & Jackson

*etheocles evansi* van Someren & Jackson, 1957. Type locality, Elgon east, TransNzoia.

(*etheocles* f. *evansi* van Someren & Rogers, 1932.)

Region 5. ♀ f. *evansi* et vars.
*conjuncta* van Someren & Jackson, 1957.
♂ f. *evansi* (nr. *carteri*) et vars.

Range: Kenya, N.E. and eastern areas of Mt. Elgon, TransNzoia to Mau Lunbwa, Londiani, Sotik-Mara, Lembus and Ravine.

## 5. ***CHARAXES GRAHAMEI*** VAN SOMEREN

### ***Charaxes grahamei* sp. n.**

(Pl. 12, Text-figs. 7–8 [aedeagus])

In dealing with these specimens, one is faced with the problem of reaching a decision based upon rather subtle evidence. Any student of the "*etheocles*" group will admit that even where specific identity has been established beyond any doubt, many of the males and females are so superficially alike that they can be misidentified without close examination.

The facts in this particular case are:

1. The males are confusingly like ♂ *etheocles carpenteri* on the upperside; on the underside they resemble, to a certain degree, that of *etheocles* ♂ f. *catochrous* (a form which occurs throughout the various subspecies).

2. The nominate female of *grahamei* superficially resembles members of the group of ♀ *etheocles*, which embraces the forms *alladinis*, *carpenteri*, *seriata* and *regalis* and vars., all of which are "western" with the exception of *carpenteri*, which is the eastern representative of *alladinis*. No known form of *carpenteri* resembles *grahamei*; all of them have the blue bar in the hind wing in the discal line. The form *regalis* of western *etheocles* does however have the bar in the discal line, but this form does not occur in eastern Africa.

3. *Ch. etheocles carpenteri* in its various forms occurs in the forests on the eastern side of Lake Tanganyika, thus occupying the same habitats as *grahamei*. These *carpenteri* ♂ are of normal size.

4. *Charaxes grahamei* is always considerably larger, in both sexes. I do not believe that this is a case of "giantism" amongst an otherwise normal population of *etheocles carpenteri*.

5. The genitalia of *grahamei* and *catochrous* have been dissected by T. G. Howarth. They differ considerably (*vide* Text-figs. 2–4, 7–8).

On this evidence, I am satisfied that *grahamei* cannot be considered a " form " of *etheocles carpenteri*, nor yet a subspecies of *etheocles*. The material examined consists of nine males and eight females, all from the Mukuyu-Muhimo forests of the Kigoma district, north-east of Lake Tanganyika.

MALE. Fore wing length 40 mm. (average 39 mm.) base to apex; 29 mm. along hind portion of wing from base to end of vein 1, (average 28 mm.). Comparable figures for *etheocles carpenteri*, 34–35 mm. and 27 mm. Shape as in *etheocles* but costa slightly more curved; curve on outer margin appears stronger because of projecting tornal angle. Margin of hind wing more serrate than *etheocles carpenteri*. *Upperside*. Ground colour deep velvety black, margin of fore wing with very small internervular glaucous marks, double at tornal angle; edge with very slight white fringe. Blue marks small, limited to one beyond end of cell in discal line; (in some specimens there is a minute dot at upper end of cell, a slightly larger spot beyond and a minute subcostal spot at subapex). Hind wing ground colour velvety black, slightly greyish on inner fold; submarginal row of white spots, slightly blue distally, very distinct but well spaced; marginal border narrow, greenish lunules indistinct except toward anal angle; margin black. Tails rather short, 5 and 3 mm., black-edged with white mid line. *Underside*. Fore wing ground colour silvery greyish, with rather strong satiny sheen; slightly brownish in interspace between discal and postdiscal zones and on outer border; basal black spots and lines distinct but not heavy; wavy black line between discal and submarginal zone distinct up to 2 then fading out but with distinct black spot in 1b; submarginal marks faint but strong and black at tornus. Hind wing ground colour strong silvery grey up to discal line with a whitish zone in this area; border slightly browner; postdiscal row of lunules silvery greenish and brownish, outlined proximally in black, strong from costa to above anal angle; submarginal row of whitish linear marks complete and accentuated by black marks in region of tails, double at anal angle; marginal border reddish above upper tail then greenish to anal angle. (Pl. 12, figs. 98, 99 type.)

A slight variant may exhibit a stronger brownish tone to the distal halves of both wings and a slightly stronger pattern, especially on the hind wing on the underside.

The nominate female of *grahamei* is a blue-patterned form which resembles somewhat the form *regalis* of *etheocles*.

FEMALE. Fore wing length 42 mm. *Upperside*. Ground colour blue-black with a tinge of purplish and a blue sheen over basal half; discal row of spots purplish blue and complete from the subcosta to hind margin, the spot in 4 minute but the rest increasing in size to the streak in 1a on the hind margin; postdiscal spots complete, three subapical in a row, rather whitish, the remainder bluish to purplish blue, spot in 2–3 following the contour of the wing but that in 1b set in a little. Margin with faint indication of glaucous marks, double and more visible at tornus; fringe narrowly white between veins. Hind wing ground colour blue-black with strong blue sheen at basal half, distal border blacker. Discal band blue with slight greenish sheen, inner border straight, spot at costa more whitish; a discreet spot at subcosta in the postdiscal line; band widest at 6–7 then tapering toward the hind angle but not crossing the inner fold; submarginal row of linear white marks strong; marginal border strongly orange-red to lower tail then olive to anal angle. Tails long, 8 and 6 mm., black with reddish mid line. Margin of wing black with fine white fringe, and slightly dentate. *Underside*. As in the male, the underside is silvery grey with a slight brownish tinge to outer border of fore wing, and to a lesser degree in the disco-postdiscal interspace; the whole surface has a satiny sheen so that the usual satiny bars are obscured. The black lines in the basal area to discal line very fine; the discal and postdiscal rows of whiter spots not strongly defined; the usual submarginal dark spots absent except for the double spot in 1b which is black and strong as are the two spots in 1a–1b more proximad in postdiscal line. Hind wing black lines in basal area very fine; discal bar only slightly indicated; the postdiscal wavy line of greyish green and maroon lunules rather lost in the greyish ground except those above the anal angle; marginal border reddish to base of upper tail, then olive-grey to anal angle, the inner black marks small. (Pl. 12, figs. 100, 101, type.)

Holotype male. TANZANIA: Kigoma District in Mukuyu Forest, 1964 (Major *I. Grahame*). To be deposited in B.M. (N.H.).

Allotype female. Same locality, 1965 (Major *I. Grahame*).

A slight variant has the discal and postdiscal spots in the fore wing slightly larger; the marginal glaucous marks larger. On the hind wing the blue bar is not so broad and the upper spots in the postdiscal line are free. Otherwise the insect is very like the type. The underside is silvery greyish with the pattern obscured.

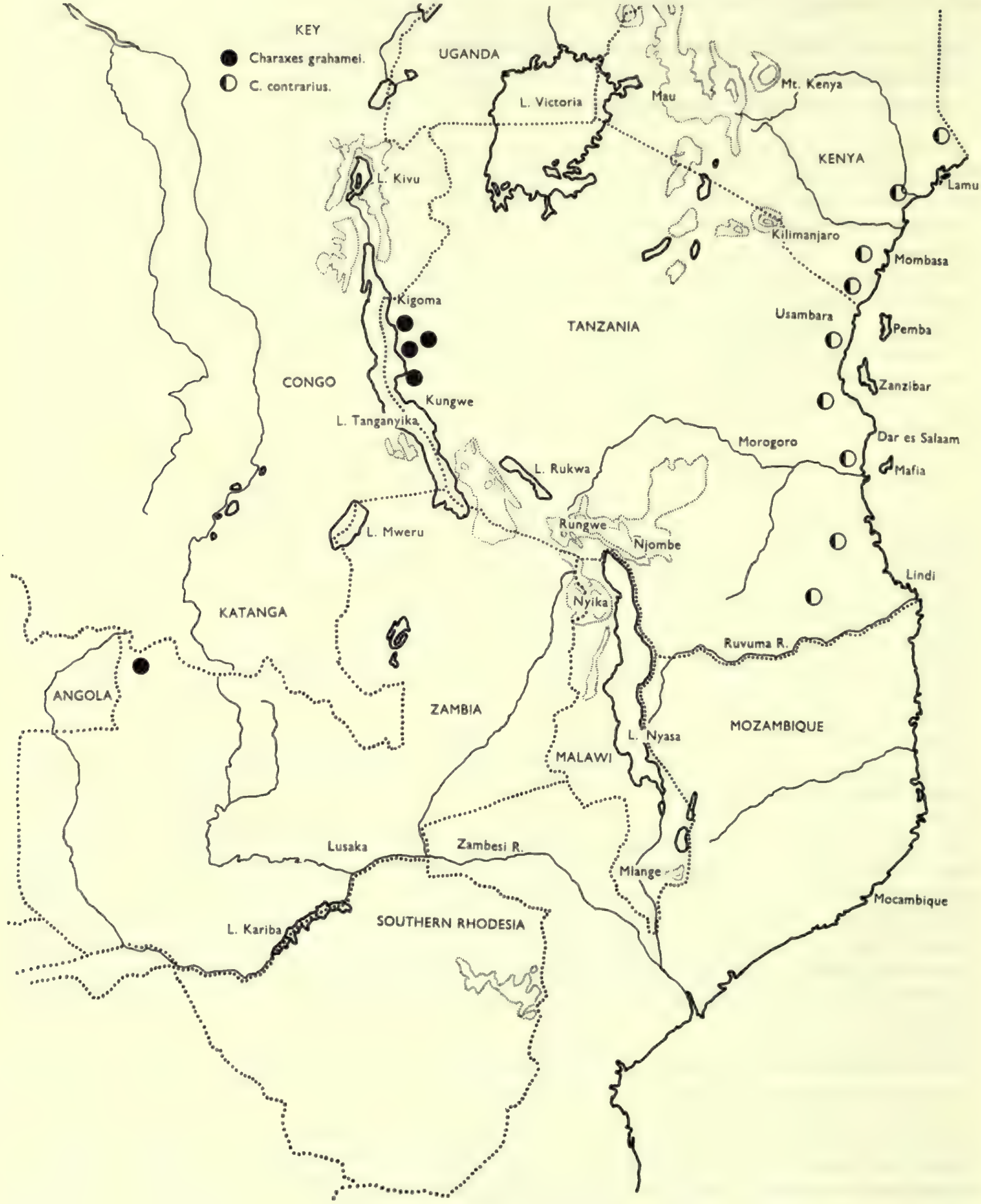
*Variation. Upperside.* Well-marked, with large fore wing discal and postdiscal blue spots, the lower marks in the discal line enlarged and extended distad and almost conjoined to the spots in the postdiscal row by rays and blue scaling; there is an extra blue spot in 1a in the postdiscal row. The hind wing blue band is strongly blue in the discal line with slight purple tinge in postdiscal line in 5–6. *Underside.* Silvery grey with a brownish tinge on the border of the fore wing which offsets the whitish spots of the postdiscal row. The hind wing has a stronger pattern than the type but the ground colour is silvery grey. (Pl. 12, figs. 104, 105.)

### ♀ form ***lacteata*** **forma n.**

This interesting form exhibits the general pattern of female " *etheocles* ", i.e. the fore and hind wing light areas are white instead of blue. Fore wing length 42 mm. *Upperside.* Ground colour black, slightly brownish in the basal area. There is a small white dot at upper end of cell; the spots in the discal row strong and increase in size from the costa to the hind margin, those in 1a–2 extended distad and fused with the postdiscal spots in these areas; the two upper postdiscal spots in the subapex are large, the third one smaller followed by spots of increasing size to 2. All these spots are creamy white. Marginal marks are indistinct, whitish but more distinct at tornal angle in 1b. Hind wing brownish black at base, black along the border. The discal band is very broad, extending from the costa to 3 then tapering to the inner fold above the anal angle, colour creamy with some bluish scaling on the inner border and more strongly bluish on the lower half of the outer border. Submarginal row of linear white marks strong; marginal border ochre-red to base of lower tail then olive to anal angle; edge black with slight white fringe between tails; tails moderately long upper 7 mm., lower 5 mm. *Underside.* Fore wing ground colour light brownish grey, slightly more brownish between discal and postdiscal zones and on the outer border. Basal black marks not heavy but discal and postdiscal spots clear and whitish; submarginal dark marks strong at tornus and area above. Hind wing basal area light brownish grey followed by a more brownish bar on proximal side of the well marked discal creamy band; the postdiscal row of lunules brownish slightly greenish ochre above anal angle; submarginal linear white marks strong, with usual black dots toward anal angle; marginal border reddish to base of upper tail then olive to anal angle. (Pl. 12, figs. 102, 103, type.)

Holotype female. TANZANIA: Kigoma district, Mukuyu Forest, 1965. Presented to the B.M. (N.H.) by Major Iain Grahame.

*Variation. Upperside.* Ground colour of fore wing with rather more purplish blue sheen; discal and postdiscal spots arranged as in nominate form but less fused in hind area 1a–2; where spots are tinged with violet-blue, others creamy white. Hind wing discal band broad, rather irregular on outer border, white, with some bluish on lower half of outer border. Marginal border as in nominate. *Underside.* Ground colour greyish brown with a slight overall rusty ochre tinge; the fore wing spots of both series ochre; only one black spot at tornus with pale surround. Hind wing ground colour as fore wing, the discal band rather suffused over with greyish but whiter in subcostal area; row of lunules in postdiscal zone only slightly indicated;


KEY
● Charaxes grahamei.
◐ C. contrarius.
UGANDA
L. Victoria
Mau
Mt. Kenya
KENYA
Lamu
L. Kivu
Kilimanjaro
Mombasa
Kigoma
Usambara
TANZANIA
Pemba
Zanzibar
CONGO
Kungwe
L. Tanganyika
Morogoro
Dar es Salaam
Mafia
L. Rukwa
Rungwe
Njombe
L. Mweru
Lindi
Nyika
KATANGA
Ruvuma R.
ANGOLA
ZAMBIA
L. Nyasa
MOZAMBIQUE
MALAWI
Lusaka
Zambesi R.
Mlange
Mocambique
L. Kariba
SOUTHERN RHODESIA

Map 5.

submarginal linear marks subdued; marginal border obscured, dull reddish to upper tail then olive to anal angle.

Range. This species is found in the forests of the Kigoma district, north-east of Lake Tanganyika, extending southward to the forest of Kungwe Mt. in the Mpanda district.

It is to be noted that *Charaxes etheocles carpenteri* also occurs within this range, the male forms *carpenteri* and *catochrous* having been taken in considerable numbers. (Maps 4, 5).

## 6. *CHARAXES CONTRARIUS* WEYMER AND *C. PETERSI* SP. N.

### ***Charaxes contrarius*** Weymer

(Pl. 13, Text-figs. 27, 28 [aedeagus])

*Charaxes contrarius* Weymer, 1907 : 44.
*Charaxes subargentea* van Someren & Rogers, 1932 : 167.
*Charaxes catochrous contrarius* Weymer; van Someren & Jackson, 1952 : 279.

When I described *Charaxes subargentea* in 1932, I did so on the assurance of the late Dr. Karl Jordan that the species had not been described previously, but we had both overlooked Weymer's *contrarius*, published in 1907. The subsequent association of *contrarius* with *catochrous* by van Someren & Jackson in 1952 was most unfortunate, for *catochrous* is but a male form of *etheocles* (vide *Ch. etheocles* (Cramer) p. 99). The differences between *catochrous* and *contrarius* were clearly set out by us then; beyond the somewhat silvery underside exhibited by both, there is no real resemblance between the two. No subspecies of *etheocles* is known to occur within a thousand miles of the range of *contrarius*, the intervening country being unsuitable to *etheocles*.

The recently described *Charaxes martini* van Someren, 1965, from southern Malawi, may be related to *contrarius*, but insufficient material, especially authentic females of this southern insect, precludes any definite decision on this point.

MALE. Fore wing length 30–40 mm. Shape incurved on outer border at 3–4, apex falcate, thus very like *Charaxes viola kirki*. *Upperside*. Ground colour blue-black with strong blue sheen at base of costa. Blue spots in subcostal region slightly variable in number and size, but there is usually a spot at the upper part of end of cell, one large spot with a small one below in the discal line, two blue spots in the subapex; margin with distinct glaucous lunules, often strong, and with a white streak in centre of each. Hind wing ground colour blue-black, greyer on the inner fold; a slight greenish sheen sometimes present over lower part of disc sometimes represented by an indistinct wavy greenish line opposite tails; submarginal row of short linear white marks distinct; marginal border with maroon lunules outlined in olive, then olive to anal angle usually strong, but may be obscured, edge black, tails long, of about equal length, 5 mm., black with central olive-red streak. *Underside*. Fore wing ground colour silvery greyish to discal line, slightly browner beyond to the postdiscal series of greyish spots, outlined proximally in areas 1a–6 in blackish, followed by the submarginal row of darker diffuse marks which are black in 1b at the tornus. Basal black marks well defined but thin. Hind wing basal area silvery, more whitish toward the inner fold; basal black lines thin; ground colour more tinged with brownish in the postdiscal line which has conspicuous olive and maroon lunules accentuated proximally in black; submarginal row of linear marks rather broad in the type but usually well defined and outlined distally in black, particlarly in region of tails; border brick-red above upper tail then olive to anal angle. (Pl. 13, figs. 106, 107, type.)

*Variations. Upperside.* The size and number of blue spots on the fore wing reduced and the marginal lunules smaller. On the hind wing the submarginal spots are small and partially obscured while the marginal border is narrow, broken and mainly greenish. *Underside.* The fore wing distal pattern is stronger while on the hind wing, the band carrying the postdiscal lunules is strongly brownish; the submarginal linear pale marks continuous and not interrupted; the marginal border is strongly reddish above upper tail then olive to anal angle. Pl. 13, fig. 108.

*Female.* There are two distinct patterns of female: (a) those with an " *etheocles*-like " pattern, and (b) those with a " *rosae*-like " pattern. The former predominates.

### (a) ♀ form ***contrarius***, nominate form

Size rather variable, fore wing length 35–42 mm., average 38 mm. In shape the fore wing may be strongly falcate (as in Pl. 13, fig. 111) or the outer margin may be less incurved at 3–4 as in the majority. *Upperside.* Ground colour blue-black or slightly brownish black, with blue sheen towards the base of fore wing. There may be a white spot at upper angle of end of cell, more often missing, seldom large; the discal row of spots as follows: two subcostal, the upper large, quadrate-elongate, usually no spot sub-base in 4, but when present is often large; the spots from 3 to hind margin increasing in size, the increase usually on the distal end, these marks are usually white. The spots in the postdiscal row are three subapical in a row of about equal size, spot in 4, sometimes missing, is set in, those of 3 to 2 may be free or slightly joined to discal mark in same area, that of 1b fused with discal mark. Margin with no marks as a rule but may be very faintly indicated at tornus. Hind wing basal area blue- or brownish black, slightly greyer in the inner fold, border black; discal white band broad, commencing at costa and widening opposite cell, then gradually diminishing and tapering to above the anal and crossing the inner fold; the band may be slightly blue-tinged on borders from mid point to anal angle; the submarginal line of linear bluish white marks distinct and well separated; border reddish to upper tail, then olive to anal angle; margin black. Tails long and thin, upper 8 mm., lower 5–6 mm., black with reddish or olive mid line. The fore wing white discal bar is the main feature of the wing and may widen abruptly from 3 to hind margin. (Pl. 13, figs. 109–112.)

*Underside.* The ground colour in all these forms is silvery greyish, slightly tinged with brownish in the curve of the fore wing. The basal black lines are fine but distinct; the discal bars are whitish, the upper postdiscal spots buffish; the submarginal dark marks strongly represented in the tornus at 1b and in an area above and are black and touch the postdiscal spots in these areas. The hind wing ground colour is satiny silvery grey with a slight brownish tinge in the base; the discal white band shows up strongly but reduced in width and tapering rapidly toward the inner fold which is crossed above the anal angle. The postdiscal bar of olive and maroon lunules is very strong except toward the costs. The border is slightly more brownish and the submarginal row of linear white to lilac marks are continuous and strong, accentuated distally by black marks; the marginal border strongly reddish to upper tail, then olive to anal angle.

*Variation.* (a) *Upperside.* The fore wing discal and postdiscal spots in the upper section may be creamy, creamy ochreous or ochreous.

*Variation.* (b) *Upperside.* The upper fore wing spots may be slightly conjoined by rays; the spots are white.

*Variation.* (c) *Upperside.* A rather striking variant in which the ground colour is a deep blue-black; there is a well developed white spot in the fore wing cell; the white marks from 3 to hind margin fully conjoined, the marks in 1a–1b bluish at the ends; the hind wing band, white in the mid area, is strongly bluish on both borders, especially on the proximal border. (Pl. 13, fig. 111.)

*Variation.* (d) *Upperside.* This is an extreme of (b) in which all the wing spots are fused from 5 to 1b, the upper spots larger than usual. The hind wing band is exceptionally broad and expanded proximally and strongly blue on the inner border.

### (b) form ***conjugens*** **forma n.**

(Pl. 13, fig. 110)

♀ form ***rosae*** pattern (Pl. 13, fig. 112)

Size rather variable, fore wing length 35–44 mm. Shape similar to other forms. *Upperside.* Ground colour of fore wing brownish black, sometimes with a slight purplish sheen at base. The conspicuous white curved band commences as a white spot at the upper part of the cell (it is of interest that a spot in the cell is unusual in the nominate form) which is continuous with a larger triangular mark beyond at base of 4, and this, with a larger triangular mark at base of 3, an elongate mark in 2 with obliquely cut proximal end, followed by elongate quadrate mark in 1b and streak in 1a completes the band. The upper discal and postdiscal spots are usually large and free, but may be small. Marginal glaucous or greyish marks hardly visible except at tornus. Hind wing basal area brownish black, greyer on the inner fold. The discal white band commencing at the costa, expands over the mid-region then tapers to the inner border and crosses it above the anal angle as a narrow white mark; the band is mainly white but may have some bluish scaling on the borders especially at the lower half. Border of wing black and broad, the submarginal linear white marks distinct or slightly obscured opposite tails, but here bordered by black distally; marginal border reddish to upper tail then olive to anal angle; margin black; tails long and thin, 8 and 6 mm. long, black edged with olive or whitish mid-line. *Underside.* Ground colour slightly variable silvery greyish or with varying amount of pale brownish suffusion. Fore wing black basal marks thin out distinct; pattern of upperside strongly represented; tornal black mark and one above very strong. Hind wing silvery grey at base, browner on border, the discal band strongly marked but narrower than above and tending to fade out above anal angle, but postdiscal series of olive and maroon lunules strong; submarginal row of linear marks usually strong; with strong black distally especially in region of tails; marginal border reddish above upper tail then olive to anal angle. (Pl. 13, fig. 112.)

*Variation.* An occasional specimen may have on the upperside a fore wing bar of more even width and the white scaling extending onto the costa. The hind wing band however is limited at the costal end to a large free spot in the discal line, and a reduced mark in 5; the lower part of the band strongly flushed with bluish.

Range: Kenya, occuring in the coastal forests and heavy savanna from just north of Lamu in the Mundane range to the Sekoke-Arabuko forest, the Rabai Hills south to the Shimba Hills and the coastal forests at Zombo and Marima Hill in the Kwale district. Tanzania, the lower forests of the Usambara range, and the Pugu forest, south to Lindi. (Maps 4, 5).

## ***Charaxes petersi*** **sp. n.**

(Pl. 13, figs. 113, 114; Text-fig. 25 [aedeagus])

This interesting new species was first taken by Dr. W. Peters in Liberia at Kitoma, 1,600 ft. in August of 1953, and remained unrecognized until 1965 when Dr. Arthur Rydon made dissections of the genitalia of the type and other specimens. All had genitalia which differed markedly from those of *Charaxes etheocles*, which is common in the area. The species was taken subsequently by Monsieur A. Gallay in the Ivory Coast at Abidjan; these specimens have similar distinctive genitalia. Unfortunately, all examples are males; the female is not known with certainty.

This species comes within the " *etheocles* " s.l. aggregate, and indeed is very similar in general appearance, especially on the underside, to the *catachrous* form of *etheocles etheocles*, and could easily be mistaken for it.

MALE. Fore wing length 30 mm., (type), 29 mm., paratypes. *Upperside*. General appearance very similar to male *etheocles etheocles* (Cramer), deep velvety black with slight greenish sheen at base of the fore wing costa. Fore wing immaculate except for an obscure blue subcostal spot toward end of the cell, a smaller blue spot at base of 6, two bluish white spots at mid 8–7 and a small white subapical dot in 8. Margin with very obscure glaucous lunules and slight white fringe between veins. Hind wing ground colour as fore, slightly browner on inner fold; disc immaculate but submargin with small punctiform white dots, double at anal angle; margin with glaucous lunules, edge black with slight white fringe. Tails short, 4 and 3 mm. long, black with central glaucous streak. *Underside*. General appearance very similar to the *catachrous* form of *etheocles*, but base of fore wing with more pronounced silvery satiny sheen; discal bar silvery edged internally with black crescentic marks; postdiscal lunules silvery, inwardly margined in black and distally with series of rounded dark spots, strongest at tornus, that at hind angle and in 1b, ringed greyish; margin brownish. Hind wing basal area greyish brown with fine wavy black lines in sub-base; discal bar strongly silvery from costa to above anal angle where it crosses the inner fold, bordered distally by a brownish zone; the postdiscal greyish and brownish ocelli well marked; admargin with whitish lunules accentuated distally with black, most apparent in area between tails and at anal angle; margin black with very slight white fringe.

For formation of the aedeagus, *vide* Text-fig. 25, it will be noted that the main " tooth " or spine is extremely large and prominent, and is situated on the ventral or ventro-lateral side of the shaft of the penis.

Holotype male. LIBERIA: Kitoma, 1,600 ft., viii.1953 (*W. Peters*). In B.M. (N.H.).

Paratypes. Same data, in B.M. (N.H.), and one male from IVORY COAST in National Museum, Nairobi, Kenya. Other males from Ivory Coast in coll. Gallay.

Range: Liberia, in forested areas at Kitoma; also on the Ivory Coast, in forest at Abidjan. The species has not been bred.

## 7. *CHARAXES BAILEYI* VAN SOMEREN

### ***Charaxes baileyi*** van Someren

(Pl. 14, Text-figs. 13–14 [aedeagus])

*Charaxes baileyi* van Someren, 1958 : 4.

This insect was referred to very briefly by van Someren & Jackson (1952 : 285). There were two female specimens of uncertain status, one from Ravine, the other from Rongai on the western side of the Rift Valley.

The species was subsequently taken at an intermediate locality, Visoi Gap, by J. H. Bailey. This was a female with a broad blue band on the upperside of the hind wing, similar to the first specimen taken at Ravine. When on a visit to the Visoi area, I was successful in obtaining a few females from which I raised families with sufficient progeny to indicate the constancy of both male and female characters.

Several additional males and females have been secured by Mr. Bailey during the past year or so.

MALE. Fore wing length 35–37 mm. with only a very slight inward curve on outer border. *Upperside.* Ground colour intense blue black with slight blue sheen at base; glaucous marginal marks triangular or lunate usually well marked; subcostal blue spots, one minute dot at upper end of cell, a larger spot in discal line, a small dot in upper subapex. Hind wing ground colour intense black with some greenish sheen toward postdiscal zone where there may be the slightest trace of a greenish zigzag bar opposite tails, but usually absent; submarginal row of linear white marks distinct, well separated; marginal border greenish, more olive at anal angle; extreme edge black with slight white fringe. *Underside.* Fore wing ground colour greyish brown, browner in zone between discal and postdiscal lines, more so in slight curve of the wing on outer border, but the satiny sheen is strong over the discal zone and toward the subapex; the pattern is thus rather strong; the submarginal dark spots, ringed in greyish, black at tornus then more brownish to subapex. Hind wing ground colour as fore with a slight olive tinge; sub-basal and discal satiny bars strong; the postdiscal wavy line of lunate marks olive and maroon, outlined proximad in black; submarginal series of pale linear marks well marked. (Pl. 14, figs. 115, 118, holotype.)

There is little variation in the males on the upperside; in the fore wing the subcostal blue spots may be reduced in size and number; on the hind wing the submarginal linear marks may be obscured. On the underside, the pattern may be less strong but the satiny zones are still marked; the postdiscal line may be bronzy. The shape of the hind wing in *baileyi* is more rounded and less pyriform than in *berkeleyi* which flies with it. I selected as the type female of nominate *baileyi*, the form predominating with a broad discal band in the hind wing.

FEMALE. Fore wing 38–40 mm. *Upperside.* Ground colour deep blue-black with strong blue sheen at base of wing. There is a suggestion of a blue spot at the upper end of the cell; the discal spots are one large subcostal with a dot below, followed by a small spot sub-basal in 4 set well in, two larger spots in 2 and 3, and a suggestion of blue scaling in 1b; the postdiscal row of spots well marked and blue, three subapical in line, followed by spots in 4–2 slightly larger and set in, the mark in 1a and 1b larger and bluer, that in la, a streak; margin with small glaucous marks, largest in 1b at tornus. Hind wing ground colour as forewing; a broad blue band crosses the disc of the wing, represented in subcosta by a free quadrate spot in postdiscal line, the band tapering to the inner fold above the anal angle. Beyond this band a black border carrying the complete series of crescentic blue and white marks, double and more bluish at anal angle; marginal border reddish and green slightly outlined in mauve; extreme edge black with narrow white fringe. Tails rather long, upper 7 mm., lower 5 mm., black edged with reddish median line. *Underside.* Basically similar to that of the male as regards pattern, but the discal and postdiscal spots of upperside are represented by buffish spots and the whole ground colour is paler and browner but the dark spots toward the hind angle are strong, particularly that at the tornal angle. On the hind wing the pattern is subdued in the basal area; the postdiscal line is not strong except opposite the lower tail and above this there is a somewhat quadrate pale mark on the inner fold; the submarginal linear lilac marks are well developed, the marginal border of reddish to upper tail then olive to anal angle is rather narrow. (Pl. 14, figs. 116, 119, allotype.)

There are several *variations* of this form. (a) *Upperside.* The fore wing spots are mainly bluish, the marks in the discal line not extending to the hind margin in 1a–1b, the postdiscal series extending to 1b as a blue streak. The hind wing blue band as in the nominate form, the submarginal spots blue and the marginal border strongly reddish to lower tail then olive to anal angle accentuated proximally in green. *Underside.* Ground colour more rufescent, especially on the outer border of fore wing; the hind wing more rusty, and the postdiscal line of lunules almost entirely reddish.

*Variation.* (b) *Upperside.* Fore wing upper discal spots are white, but strongly blue in 1a–1b, the marks coalescing with the large blue marks in 1a–1b of the postdiscal series; the margin of the wing with diffuse glaucous marks. The hind wing discal blue band broad and complete to the costa; the submarginal bluish white marks large; the border greenish with a few reddish scales above the upper tail. *Underside.* As the nominate form but discal spots in fore wing from 2—costa white.

*Variation.* (c) *Upperside.* Fore wing spots in the upper sector in both discal and postdiscal rows are small and obscured but those in 1a–1b and slightly in 2 conjoined and strongly blue. The hind wing band broad and complete to costa; the submarginal linear marks strongly blue and in marginal border green, slightly more olive at anal angle. *Underside.* As in nominate form. These forms occur in bred material from the type locality.

*Variation.* (d) Merely a colour variant in which the blue spots and hind wing band of upperside are strongly greenish blue (Mau-Narok.)

## ♀ form ***pseudocarpenteri*** van Someren, 1958 : 5

This form bears a superficial resemblance to female f. *carpenteri* of *etheocles carpenteri*, but the two do not fly together. The length of fore wing is 40–42 mm. *Upperside.* Ground colour blue-black with purplish brown shading toward the base, sometimes shot with green. The spots in the discal zone are limited to those in subcosta to area 2 and these are white or slightly bluish white; the postdiscal series complete and ending in a streak in 1a, the subapical spots white, the remainder blue. The blue band on the hind wing is limited to the postdiscal zone and extends from the subcosta to just above the anal angle, the mark in 6 is set in so that there is a double kink in the bar; the submarginal linear marks are bold and bluish white; the marginal border reddish above upper tail and olive to anal angle. Tails as in nominate form. *Underside.* Ground colour purplish grey-brown with a golden olive bloom over the base of the fore wing and on the border; the pattern very similar to the nominate form but whitish marks in discal area limited to spots above. Hind wing ground colour as fore but golden olive bloom covers the whole of the disc, but is traversed by satiny bars in sub-base and discal line. Submarginal line of pale marks strong but rather fused in region of upper tail, spots bordered by olive marks distally, double in anal angle; border reddish to upper tail then olive to anal angle. A quadrate whitish grey mark is present at inner fold above the dark postdiscal mark, the rest of the postdiscal lunate marks not strong, reddish olive.

*Variation.* (a) *Upperside.* Similar to typical, but all fore wing spots blue; the postdiscal blue bar in hind wing bordered with bronzy golden scales. (Pl. 14, figs. 117, 120.)

*Variation.* (b) A paratype specimen of this form has the upperside ground colour of fore wing blue-black, slightly bluer toward base; postdiscal spots reduced in number and the postdiscal series present but obscured, the mark in 1a elongate along the hind border. The hind wing ground colour blue-black shaded with purplish brown towards the base; the blue band is limited to the postdiscal area but does not reach the costa; the black border carries a row of linear bluish white marks extending from upper angle to anal angle; the marginal border is a mixture of greenish and red scales to upper tail then olive to anal angle. Tails as in typical form.

Bionomics: A full account of the biology of this species can be found in the original description. (1958 : 5) The species lays on *Scutia myrtina* Burm. s.l. (Rhamnaceae). Families bred from ♀ form *baileyi* produce both *baileyi* and ♀ form *pseudocarpenteri*; and *pseudocarpenteri* also produces both forms; variants appear in some families. The males are remarkably constant.

Range: So far, this species has only been taken west of the Rift Valley in Kenya at Visoi Gap between Kilombe Hill and Londiani Hill, at Molo and Ravine, at Mau-Narok, and recently on the eastern slopes of Mt. Elgon. Thus there is a considerable overlap with *Charaxes berkeleyi* ssp. and *Charaxes etheocles evansi*. (Map 1).

## SYSTEMATIC LIST

### ***Charaxes grahamei*** sp. n.

*Charaxes grahamei* sp. n. Type locality: Tanzania, Kigoma Dist., Mukuyu Forest. Range: Tanzania, Kigoma Dist., N.E. of Lake Tanganyika and southwards to Mpanda Dist., Kungwe Mt.

♀ f. *lacteata* forma n. Type locality: Kigoma Dist., Mukuyu Forest.

### ***Charaxes contrarius*** Weymer

*Charaxes contrarius* Weymer, 1907. Type locality: " German E. Africa ". Range: Kenya, coastal forests and heavy savanna from Mundane Range, Lamu to Sekoke to Arabuko Forest, Rabai Hills, Shima Hills, Zombo, Marima Hills, Kwale Dist., Tanzania, Usambara Range and Rugu Forest, south of Lindi.

♀ f. *conjugens* forma n. Type locality: Shimba Hills, Kwale.

### ***Charaxes petersi*** sp. n.

*Charaxes petersi* sp. n. Type locality: Liberia, Kitoma. Range: Liberia and Ivory Coast.

### ***Charaxes baileyi*** van Someren

*Charaxes baileyi* van Someren, 1958. Type locality: Kenya, Visoi Gap. Range: Kenya, west of Rift Valley at Visoi Gap, Kilombe Hill, Molo, Ravine, Mau-Narok and Mt. Elgon.

♀ f. *pseudocarpenteri* van Someren, 1958. Type locality: Kenya, Visoi Gap, Kilombe Hill.

## 8. ***CHARAXES VIOLA*** BUTLER AND ITS SUBSPECIES AND FORMS

### ***Charaxes viola*** Butler

Butler described this insect as a species in 1865. Subsequently, Rothschild and Jordan (1900) referred to *viola* as a subspecies of *etheocles* (Cramer), 1777. Aurivillius (1925) and subsequent authors followed the general classification advocated by Rothschild.

Van Someren and Rogers (1925 : 42–43) drew attention to certain breeding experiments which seemed to indicate that " *etheocles* ", as defined by Rothschild, was an aggregate of several well defined species. This view was upheld and amplified by van Someren and Jackson (1952 : 257–259), and was followed by a tentative division of the group into species, being further amplified by us in 1957. *Charaxes viola* Butler was reinstated to specific rank and several subspecies were recognized. The present revision carries the investigation still further, and is based on a great deal of additional material and data.

This species, throughout its range and in all its racial forms, is an insect of the savanna country, i.e. " thorn-bush " or " orchard country ", light riverine gallery forest, and dry forest areas, thus seldom extending into areas of heavy forest. *Charaxes etheocles* on the other hand, is generally an insect of heavy forest.

If one studies a " Vegetational Map " such as that of UNESCO, 1959, it will be noted that areas of various types of savanna or woodland extend from W. Africa to Abyssinia and Somalia, eastern Africa to Central Africa and to S. Africa north of Lat. 25° with varying degrees of tree coverage; Zones 8, 16, 18, 20, 21–22, and 25. The known ranges of *Charaxes viola* correspond more or less with these areas which are described as: Forest-savanna, mosaic woodland, savanna woodlands, wooded steppe, etc., the main trees being *Acacia*, *Combretum*, *Commiphora*, *Terminalia*, *Brachystygia*, *Albizia*, *Entada* and *Isoberlina*. Many species of some of these genera are food plants of *Charaxes viola*.

This type of habitat being more or less continuous, either as large blocks or even narrow corridors, from west to east and east to south with no natural ecological barriers completely severing the continuity, we find some evidence of merging of the subspecies into which *viola* has been divided. One is thus faced with the problem of deciding which of these races is taxonomically sound, i.e. do they represent restricted or isolated breeding communities or are some bio-ecological strains affected by climatic conditions and restricted food plants, yet exhibiting evidence of considerable genetical control of female forms. There is often a size difference.

On the evidence of the considerable material before me, *Charaxes viola* can be divided into four main groups, based on female forms (1) a western group (W. Africa to Uganda) in which the females conform to a fixed pattern and coloration, with comparative slight variation; (2) a north-eastern group (Ethiopia-Kenya-Tanzania) in which the female pattern remains more or less constant, but the colour varies from white to orange; (3) a central southern group (western Tanzania-Malawi-eastern Zambia-Rhodesia in which the female is of totally different pattern and colour but in which the white-barred female crops up again, but mostly in the southern parts of its range; (3a) S.W. Africa in which a boldly marked, white-banded ♀ is the only one recorded; (4) a southern Congo (Katanga), western Zambia-Angolan group in which the females are highly polymorphic and polychromatic.

One is led to speculate on what was the ancestral female form. By analogy, one would expect that the original female was somewhat male-like, the first major divergence being the development of discal and postdiscal spots, already present in males, most apparent on the underside. These two series of spots, originally bluish or whitish, became creamy, ochreous or orange; at first completely separated, they became partially united in the lower or hind portion of the fore wing, and in the disc of the hind wing. The appearance of form *phaeus* is difficult to explain, but if one studies the female forms of the polymorphic group 4, the possible development of this form is sensed; the greenish blue basal area present in the male became gradually intensified or became paler blue, the postdiscal spots developing concurrently with some trace of discal spots. If there is any substance in this speculation, one must assume that the polymorphic aggregates are still in a state of flux of evolutionary development, whilst the monomorphic have evolved the more rapidly and achieved stability.

I deliberately avoid the controversial subject of mimicry as an agent in the evolution of *Charaxes viola*; it abounds in pitfalls.

Since this is a taxonomic paper one should be able to define, with some degree of certainty and accuracy, the characters of the subspecies and state their distribution. In the main, these criteria can be fulfilled, but there is some evidence of apparent overlap, even merging, of aggregates to which subspecific names have been applied. There is also a paucity of material and detailed field data from some areas. I prefer, at this juncture to retain the taxa as given in the systematic list.

### ***Charaxes viola viola*** Butler

(Pl. 15, figs. 121–132)

*Charaxes viola* Butler, 1865 : 627. (Partim) Type female.
*Charaxes ephyra* Feistamel, 1850 : 255 (♂).
*Charaxes viola* Butler, 1876 : 481 (♂).
*Charaxes etheocles viola* Rothschild, 1900 : 488 (♀).
*Charaxes etheocles viola* Aurivillius *in* Seitz, 1912 : 137.
*Charaxes viola viola* Butler ; van Someren & Jackson, 1952 : 263.

#### GROUP 1, AREA 1. SENEGAL—N. NIGERIA

Females are monomorphic with only slight variation.

MALE. Fore wing length 33 mm., shape falcate. *Upperside.* Ground colour blue-black with greenish sheen especially at base of cell. A blue spot in cell, two blue spots beyond, upper large, lower a mere dot, two subapical bluish white spots, (occasionally only one), or sometimes three, continued in postdiscal line as faint blue dots from 4 to hind angle; margin with strong glaucous lunules increasing in size to tornus, slightly separated by dark veins. Hind wing black, greyer on inner fold, disc immaculate, but in postdiscal zone a wavy bluish green line, most pronounced opposite tails and fading out toward upper angle; submarginal linear marks whitish in upper part, then bluish to anal angle; marginal border greenish ochre with reddish centres, becoming more greenish to lower tail, then olive to anal angle; margin black. Tails rather short, tapering rapidly to a point, upper 4 mm., lower 3 mm. *Underside.* Ground colour greyish drab, slightly more brownish on border, or generally pale earthy brown overall. Fore wing black marks strongest in lower part of basal triangle in 1b; satiny bars faintly indicated in discal line, internally outlined in black especially towards the hind margin; postdiscal line proximally faintly outlined in black; submargin with a series of dark marks from apex to tornus increasing in size and culminating in double black tornal mark. Hind wing with an indication of a pale sub-basal bar and an irregular pale bar in discal line; basal black lines very fine and hardly indicated; postdiscal series of conjoined lunate marks greenish ochre and reddish, outlined in black proximally, extends from costa to above anal angle; submarginal whitish lilac marks not strongly developed; marginal border reddish above upper tail then olive to anal angle, with black central dots double at anal angle. (Pl. 15, figs. 123, 124.)

FEMALE. Fore wing length 40 mm., shape falcate, generally narrow, since the length of vein 1 seldom exceeds 24 mm. *Upperside.* Ground colour brownish black, slightly browner on the outer border. All fore wing spots are tawny orange except those in 1a–1b which are pale. Two spots beyond end of cell, usually no spot basad in 4, but those in 3 to hind margin gradually increasing in size, their inner ends rounded, the outer ends continuous with the postdiscal but usually with some dark scaling indicating line of junction; postdiscal spots: three ovoid in subapex, spots from 4 to hind margin increasing in size and somewhat quadrate are contiguous with the discal row. Margin with conspicuous though ill-defined tawny orange lunules, most clear from 4 to 1b. Hind wing basal triangle brownish black, disc of wing with a broad white patch slightly bluish on borders, the band goes through from the costa where it is narrow, then widens and fills the greater part of the disc, then tapers to and crosses the inner fold above the anal angle. The distal dark border is thus narrow, widest in 6–7 but narrowing to anal angle. The submarginal linear or lunate marks are whitish blue, more blue toward anal angle, and conspicuous. Marginal border reddish above upper tail then olive to anal angle, with black marks and double dots at anal angle. Margin black tails long and slender, upper 6–7 mm., lower 5 mm., black edged with ochre-olive mid line. *Underside.* Fore wing ground colour palish grey-brown in basal area, slightly more rusty toward curve of outer border; black marks strongest in lower area 1b and along the inner border of the tawny ochreous discal and postdiscal band, the inner border of the latter with subdued dark spots in submarginal line which become black at tornus at 1b and area above, the former accentuated by a pale lilac surround. Hind wing colour as fore, the basal black lines very thin; the discal band is ochreous, bordered distally by the postdiscal zigzag ochreous and reddish lunules which extend from costa to anal angle. The ground colour of the border is slightly greyish, traversed by the complete row of whitish lunate marks, slightly black lined distally, then strongly black opposite the tails; marginal border rather narrow, reddish above upper tail then olive to anal angle. (Pl. 15, figs. 121, 122.)

*Variation.* (a) *Upperside.* In the fore wing the tawny orange discal and postdiscal spots are conjoined to 5, there being a spot in 4 in discal row; the outer border of wing strongly rufous from apex to hind angle so that the lunules on the margin are fused. *Underside.* As in nominate form.

*Variation.* (b) *Upperside.* Fore wing discal and postdiscal spots well separated from 7–4 then almost separated by black scaling in 3–2. Marginal lunules not very distinct. Hind wing dark border divided into triangles by angular intrusion of the discal white band into it, which almost meet the submarginal row of linear marks. *Underside.* Pale greyish putty colour, with barely indicated black marks, only the tornal black mark distinct. The discal bands only slightly visible and suffused over.

Range: Nominate *viola* extends from Senegal to Togoland and Ghana thence to northern Nigeria and perhaps to Lake Chad, inhabiting the Savanna bush country. I am unable to check the records of *viola* from Atbara, as the specimens appear to have been lost! (Map 6).

## ***Charaxes viola picta*** van Someren & Jackson

(Pl. 15, figs. 127–130)

*Charaxes etheocles* ♂ f. *picta* Rothschild, 1900 : 483.
*Charaxes etheocles* ♂ f. *picta* Rothschild; Aurivillius, 1912 : 553.
*Charaxes etheocles* ♀ f. *vansomereni* Poulton, 1925 : 553.
*Charaxes etheocles* ♀ f. *illuminata* and f. *splendens* Rousseau-Decelle, 1938 : 161. Locality, Rio Luvna, E. Congo Belge.
*Charaxes viola picta* van Someren & Jackson, 1952 : 263.

GROUP 1, AREA 2. S. NIGERIA, CAMEROON, THEN SKIRTING NORTH OF EQUATORIAL FOREST TO E. CONGO, UGANDA, S. SUDAN AND N.W. KENYA

The females are monomorphic with slight variation.

MALE. Fore wing length 33–35 mm. (average 35 mm.), thus larger than the nominate race, and more robust; shape falcate. *Upperside.* Ground colour black with greenish sheen especially over the cell. This race is usually more strongly marked with blue spots than in nominate: a large blue spot in the cell, in discal row beyond, a large subcostal whitish spot with a smaller below, traces of blue spots in 4–2; postdiscal spots, three in a row in subapex, usually white or with slight ochreous tinge, followed by two to four small blue spots, the lower ones fading out; marginal glaucous lunules broad and strong, separated by dark veins. Hind wing ground colour as fore, greyer on inner fold; disc immaculate, but postdiscal wavy greenish line present in lower half, less clear in 5–6; submarginal bluish white marks complete but often small; marginal border reddish above upper tail, then olive to anal angle which has two black spots. Tails rather short and of equal length 4 mm. *Underside.* Darker than nominate race with black marks at base of fore wing more pronounced, so also the satiny bars, which are bordered in lower half by black; tornal mark strong. Hind wing ground colour slightly more brownish, satiny discal band more distinct; postdiscal ochreous olive and reddish lunules, outlined proximally in black stronger; marginal lunules reddish above upper tail, then olive to anal angle; black dots strong, double at anal angle. (Pl. 15, figs. 127, 128, type.)

*Variation.* (a) *Upperside.* Very similar to typical but with discal and postdiscal blue marks stronger and distinct; the subapical spots ochreous. Hind wing with strong postdiscal wavy green line. *Underside.* More strongly marked.

*Variation.* (b) *Upperside.* A variant in the reverse direction: the subapical spots limited to two small blue dots; the glaucous marginal lunules strong. Hind wing postdiscal greeny line hardly visible; marginal border with hardly and red scaling above upper tail. *Underside.* As in nominate form. (Pl. 15, fig. 129.)

FEMALE. *Upperside.* Somewhat similar to nominate *viola* but considerably larger, and, as in that race, the discal band of the hind wing is restricted at the costa but expands over the disc in mid area and lower end. (Pl. 15, fig. 130.)

## ♀ form **vansomereni** Poulton, 1925 : 553

Fore wing length usually 40–42 mm., shape falcate. *Upperside.* Base of wing brownish shading to black toward the discal band, basal area often with a greenish sheen; distal border blackish. Usually no spot in the cell, but there may be a slight indication of orange scales, two spots beyond the cell, part of the discal series, usually free, as are the three subapical in the postdiscal series; the remaining spots of both series conjoined in varying degrees; all spots tawny orange to orange but those of 1a–1b paler to whitish. Margin of wing with tawny brown lunules separated by dark veins. Hind wing basal area brownish toward costa but distally merging into the bluish white discal patch which is narrowest at the costa but expanded over the mid area then narrows to, then crosses, the inner fold, the borders of the patch tinged with greenish blue scales; the outer border of the wing blackish and wider than in nominate race: submarginal whitish to bluish marks strong; marginal border reddish above upper tail then olive to anal angle which has two black dots. Tails moderately long with rounded ends, upper 8 mm., lower 6 mm., black with olive mid line. Margin of wing black with slight white fringe. *Underside.* Rusty greyish brown ground colour with varying amount of satiny bars from hardly visible to strong especially in the subapex; black lines strongest in the basal area of 1b and on either side of the discal band which varies in distinctness, tornal black marks variable, often strong. Hind wing ground colour as fore wing, black marks fine; discal pale band variable but narrower than patch above, often limited to the discal zone, sometimes diffused over and hardly visible; the postdiscal olive ochreous and reddish lunate marks outlined proximally in black, usually strong; submarginal pale lunate marks strong to moderate; border reddish above upper tail then olive to anal angle, with black dots distinct. (Pl. 15, fig. 131.)

*Variation.* Some indication of variation has been given in the foregoing general description. *Upperside.* A marked variant has the ground colour of the fore wing rusty brown to brownish in the discal line while the outer border is strongly rusty, especially in apical half, so that the marginal lunules are absorbed into the ground colour except at the tornal angle. The discal and postdiscal orange spots are conjoined by rays. The hind wing discal band is strongly suffused over with orange scaling from costa to 5. The whole pattern is suffused over with a golden rusty bloom. (Pl. 15, fig. 132.)

Range: This subspecies occurs in S. Nigeria and Cameroon, then skirts north of the Congo equatorial forest to E. Congo, Uganda, S. Sudan and N.W. Kenya. (Map 6).

### ***Charaxes viola kirki*** Butler

(Pl. 16, figs. 133–137, Text-fig. 29 [aedeagus])

*Charaxes kirki* Butler, 1881 : 105.
*Charaxes etheocles* ♀ f. *kirki* Butler; Rothschild, 1900 : 486.
*Charaxes etheocles* ♀ f. *kirki* Butler; Aurivillius *in* Seitz, 1912 : 136.
*Charaxes etheocles* ♀ f. *rogersi*, Poulton, 1919 : lxxxi.
*Charaxes etheocles* ♀ f. *albifascia* Poulton, 1926 : 553, 555.
*Charaxes etheocles* ♀ f. *handari* Poulton, 1926 : 553, 555.
*Charaxes viola kirki* Butler; van Someren & Jackson, 1952 : 265.

#### GROUP 2, AREA 1. N. AND CENTRAL TANZANIA AND PARTS OF KENYA

Females of *viola* from most localities in this area are dimorphic on the upperside. Though somewhat similar to female *viola picta* they can readily be distinguished by the form of the hind wing discal band, which is widest at the costa, then tapers strongly to the inner border, above the anal angle, but usually does not cross it.

MALE. Fore wing length 44 mm., averaging slightly larger than *picta*; shape falcate. *Upperside*. Ground colour fore wing blue-black with slight greenish sheen at base and along costa. A large blue spot at upper angle cell end; a large spot and a small dot below beyond cell end; two subapical spots are white or slightly ochreous; glaucous marginal lunules usually large and distinct, increasing in size from apex to tornus. Hind wing velvety black with no green in postdiscal line; submarginal bluish white spots small, often indistinct except in area opposite tails and at anal angle; marginal border a mixture of reddish and green, then green at upper tail, then olive to anal angle. Tails tapering abruptly, of about equal length 5–6 mm. *Underside*. Ground colour ashy grey-brown or brownish grey, rather strongly variegated, the satiny bars and black marks strong. Fore wing with a satiny quadrate mark in cell, a satiny bar through disc and a patch at upper apex; submarginal dark marks often strong especially toward tornus. Hind wing with a sub-basal satiny bar, a rather broken bar through the disc; postdiscal zigzag line of olive and maroon lunules strong, outlined proximally in black; marginal border maroon to upper tail then olive to anal angle, strongly marked. (Pl. 16, figs. 136, 137.)

*Variation. Upperside*. Some specimens exhibit a reduction in the number of fore wing spots, the number being reduced to two small subapical which may be white or ochreous; the marginal glaucous lunules are obscured. In the hind wing the submarginal spots are only just visible in the tail region; the marginal border in this area is broken up into separate spots; the tails are mostly black. *Underside*. Black marks are reduced and the whole pattern suffused over.

FEMALE. The named female forms with orange fore wing pattern are *kirki*, *albifascia* and *rogersi*. The form with a white fore wing pattern has been named *handari*. These females can be distinguished from *picta* by their darker, blacker ground colour and the form of the hind wing discal band.

### ♀ form ***kirki*** Butler, 1881 : 105

Fore wing length 34–38 mm.; shape falcate, not so markedly as in nominate *viola* but more like *picta*. *Upperside*. Ground colour darker, almost black, especially on the hind wing border. Fore wing pattern: an orange spot usually present in the cell, varying in size and clarity; the discal and postdiscal orange spots, except for the two subcostal discal ones and the two upper subapical, fused together, with occasionally some black scales indicating the line of fusion in areas 5–3. The colour of this band is stronger orange than in *picta*, the lower portion of this band is almost parallel-sided from 3 to hind margin. Marginal lunules rusty to orange, only slightly divided by dark veins. Hind wing ground colour black, slightly greyer on inner fold; discal band widest at costa then tapering rapidly to inner fold above anal angle, but usually not crossing it; the upper or costal portion of the band tinged with orange scaling to about middle of disc; borders very slightly tinged blue; submarginal bluish white marks well separated but distinct; marginal lunules reddish maroon above upper tail then olive to anal angle; edge black, tails longish, upper with rounded end, lower pointed, length 7 and 5 mm. *Underside.* Ground colour fore wing greyish brown, pattern strong; basal black marks well developed; satiny bars distinct, a quadrate mark at end of cell and a triangular patch at upper part of apex; discal and postdiscal light marks here separated, the former pale creamy ochreous, the latter ochre-orange with a pinkish tinge, both outlined in black proximally; submarginal dark marks increasing in size and blackness, strong at tornus and area above, the tornal spot with lilac surround. Hind wing basal area darker chocolate-brown crossed by a sub-basal satiny bar; black marks fine but distinct; discal band whitish, slightly shaded brownish distally and outlined in black proximally; zigzag postdiscal olive and maroon line strong, extending from costa to above anal angle; bordered by a wide greyish brown zone; submarginal row of lilac whitish marks fairly clear, most distinct in region of tails; marginal border reddish above upper tail then olive to anal angle and carrying black dots. (Pl. 16, fig. 135.)

### ♀ form **albifascia** Poulton, 1926 : 553, 555

*Upperside.* Very similar to *kirki* on fore wing, but discal band of hind wing entirely white. (Pl. 16, fig. 133.)

### ♀ form **rogersi** Poulton, 1919 : lxxxi

*Upperside.* Generally similar to *kirki*, but both fore and hind wing bands orange or orange tawny though slightly paler on costal portion of hind wing. The ground colour of fore wing more rusty brown at base and on the distal half of the wing, so that the apical portion is almost uniform rusty, thus obliterating the marginal lunules. Submarginal spots of hind wing small, almost obsolete in upper half. *Underside.* Pattern strong, but slightly suffused with an ochreous bloom. (Pl. 16, fig. 134.)

*Variation. Upperside.* A boldly marked form in which the ground colour of both wings is more blackish, thus the orange bands of both wings are in strong contrast.

### ♀ form **handari** Poulton, 1926 : 553, 555

In this form the upperside patterns of fore and hind wings are creamy white or white.

*Variation.* (a) *Upperside.* Ground colour black with slight blue sheen over base of fore wing; two large white spots beyond the end of cell, an equally large spots at base of 4, set well in, spots in 3–1a of gradually increasing size, rounded or straight on inner side, angled on outer, are very slightly bluish on borders; postdiscal spots are, three subapical in a row, spot in 4 set in followed by free spots in 3–2; border of wing with slight indication of glaucous lunules. Hind wing ground colour black, disc crossed by a white band widest at costa then tapering to above upper angle, the borders strongly suffused with blue, especially on the lower half; submarginal bluish white spots distinct; marginal border reddish above upper tail then olive-green to anal angle. *Underside.* Fore wing ground colour greyish brown with some indication of satiny bars; pattern of upper side strongly reproduced and accentuated by black on proximal side of marks; the border of wing slightly darker brown so that the upper marks in the submargin are obscured, but tornal black mark and that in space above accentuated by a whitish surround. Hind wing ground colour more brownish than fore but discal band whitish and strongly indicated and going through to inner fold above anal angle; postdiscal whitish lilac linear marks strong; border as usual. (Pl. 20, figs. 188, 192.)

*Variation.* (b) *Upperside.* Ground colour of fore wing more brownish at base but with a bluish sheen. A white spot in the cell, discal and postdiscal ones larger than in (a), all spots creamy white.

Hind wing ground colour as fore but outer border blacker; discal band creamy white, widest at costa then tapering, lower half tinged with greenish blue scaling. *Underside.* As in (a) but ground colour paler, and pattern less strong.

Range: N. and Central Tanzania and along its coast to north of the Ruvuma River; extending into Kenya along the coast and inland to Ukambani and Masai country, spreading into the Kikuyu area, Nairobi, Thika, Fort Hall, Sagana and Nyeri. (Map 6).

## ***Charaxes viola suk*** Carpenter & Jackson

(Pl. 16, figs. 138–144.)

*Charaxes etheocles suk* Carpenter & Jackson, 1950 : 98.
*Charaxes etheocles suk* Carpenter & Jackson; van Someren & Jackson 1952 : 266.

### GROUP 2, AREA 2. N. AND CENTRAL KENYA

This aggregate comes nearest to *viola kirki*; it is very variable in size but is usually smaller.

MALE. Fore wing length 37–40 mm., shape falcate, often strongly. *Upperside.* Ground colour of fore wing black with some green sheen at base and along costa. Pattern: a small blue spot at cell end, two blue spots beyond in discal line, two subapical spots white or slightly ochreous. Glaucous marginal lunules strong; fringe white separated by black veins. Hind wing ground colour black; submarginal white dots most evident in region of tails, double at anal angle; marginal border reddish above upper tail then olive to anal angle. Tails acutely tapering and of about equal length, 4–5 mm. *Underside.* Ground colour fore wing ashy grey-brown with a satiny quadrate mark in the cell, a satiny bar through the disc and a patch in upper half of the apex; basal black marks strong; subapical white marks show through from above; submarginal dark marks complete, becoming black in 2 and at tornus, there is also a black mark in 1b in discal line. Hind wing ground colour slightly browner; a satiny sub-basal bar and a more distinct bar through disc; postdiscal olive and maroon lunules distinct but submarginal pale spots rather obscured; marginal border as above. (Pl. 16, figs. 138, 139.)

In some specimens the underside ground colour is slightly olive-tinged and the pattern is bolder, especially the satiny greyish bars in the fore wing.

### ♀ form ***kirkoides*** Carpenter & Jackson, 1950 : 98

A large to medium form very similar to *viola kirki* with upperside basal area of fore wing rather brownish; there may be an orange spot in the cell; the rest of the pattern as in *kirki*. The hind wing band is whitish with some orange scaling mostly over the upper-mid area; it is widest at the costa, tapering to the inner fold. (Pl. 16, fig. 141.)

### ♀ form ***achaemenesopsis*** Carpenter & Jackson, 1950 : 99

Variable in size, but usually 33–35 mm. in fore wing length; pattern of fore and hind wing very similar to form *handari* of *viola kirki*; the discal and postdiscal series of fore wing spots white, the band on the hind wing also white with a varying amount of bluish suffusion on the borders.

SENEGAL
RRA LEONE
LIB

CHARAXES

*C. viola viola*
One form of

*C. viola picta*
One form of

*C. viola daria*
Three forms

*C. viola chan*
One form of

*C. viola suk* (
Three forms

*C. viola kirki*
Four forms (

*C. viola phae*

*C. viola nr. p*
Only one ♀

*C. viola diver*
Numerous ♀

*C. viola loanc*
Numerous ♀

*C. viola brair*
One form of

*C. viola varic*
♂♂ strongly

*C. viola figini*

liscal

, but

rying

ıoja,
g to
'isoi.
*ıssia*

as a
the
*is* is
*viola*
ence

y of
gical

cies,

and

wing
two
with
Hind
ginal
with
line
inge.

and going
border as
*Variati*
bluish she
creamy w
Hind w
at costa t
ground co

Range
River; e
country,
Nyeri.

*Charaxes*
*Charaxes*

This a
smaller.

MALE.
colour of
spot at c
ochreous.
wing gro
anal angl
tapering
grey-brow
in upper
above; su
black ma
bar and
submargi
In som
bolder, es

A larg
rather br
The hind
widest at

Variab
very simi
white, th
borders.

An extreme variant has the discal spots in fore wing reduced in size, the lower postdiscal spots suffused over with greyish scaling; the hind wing band is narrowed considerably.

### ♀ form ***intermedia*** Carpenter & Jackson, 1950 : 98

*Upperside.* In this form the upper spots of the discal and postdiscal series are orange, but those of 2–1a are whitish; the hind band white. (Pl. 16, fig. 140.)

### ♀ form ***albifascia*** Poulton, 1926 : 553

The fore wing pattern and colour as in *kirkoides*; the hind wing band is white with varying amount of bluish on borders. (Pl. 16, fig. 143.)

Range: This aggregate is plentiful in the thorn-bush country of Karamoja, Turkana, Suk and Kara-Suk south to Kamasia and the Baringo area, extending to the Kampi-ya-Moto district north-west of Menengai, Lower Molo River and Visoi. It was taken in considerable numbers on infected, fermenting seed pods of *Cassia* at the foot of Kacheliba Rock, Suk. (Map 6).

The late T. H. E. Jackson was of the opinion that *viola suk* should be sunk as a synonym of *viola kirki.* This however, would ignore certain facts such as: (a) the males of *suk* and *kirki* differ; (b) the white-barred female form *achaemenesopsis* is extremely plentiful, making up half the female population, whereas *handari* of *viola kirki* is the exception in this population; (c) there must therefore be some difference in the genetical make-up of the two races.

It is possible that the two aggregates merge somewhere in the Kedong valley of the Rift, but this does not discount the fact that in *suk* we have a bio-ecological aggregate occupying a large area to the north of the range of *viola kirki.*

Since taxonomic Rules do not provide for any category lower than a subspecies, not even localized genetical forms, I prefer to treat *viola suk* as a subspecies.

## ***Charaxes viola chanleri*** Holland

(Pl. 20, figs. 189–191)

*Charaxes chanleri* Holland, 1895 : 753.
*Charaxes etheocles chanleri* Holland; Rothschild & Jordan, 1900 : 483.
*Charaxes viola chanleri* Holland; van Someren & Jackson, 1952 : 268.

GROUP 2, AREA 3. MT. KENYA AND NJOMBE RANGE TO S. ETHIOPIA

This subspecies belongs to the eastern group of *viola*, having the hind wing band widest at the costa and tapering.

MALE. Fore wing length 34 mm., shape falcate. *Upperside.* Ground colour of fore wing black with greenish sheen at base of cell. Spots: one large blue spot at upper end of cell; two beyond, upper large, lower small, subapical spots two or three white or slightly tinged with ochre; glaucous marginal lunules strong and only narrowly separated by dark veins. Hind wing black with slight trace of greenish wavy line in postdiscal zone opposite tails; submarginal spots suppressed but just visible in lower section; marginal border mostly greenish, with little red, the lunules somewhat triangular, the apices projecting toward the submarginal line and touching it. *Underside.* Ground colour light greyish brown with slight olive tinge.

Fore wing basal black marks strong; discal satiny bars well marked; postdiscal light marks visible, both outlined proximally in black; submarginal dark marks obscured in upper half but strong toward tornus where marks are black. Hind wing slightly browner in colour, the basal black lines thin but discal satiny pale line strong as also the olive-maroon zigzag line; border narrowly red above upper tail then olive to anal angle.

The underside may sometimes be more uniform, the black marks thin but the tornal black marks strong. In the hind wing the discal satiny bar is obscured in the general pale ground. (Pl. 20, fig. 191.)

FEMALE. Fore wing length 37–40 mm.; shape falcate. *Upperside.* Ground colour fore wing brownish black at base shading to black at discal band; outer border more brownish, shading to rusty in curve of wing where there is only a slight indication of ends of dark veins. In the discal line there is a small tawny spot at end of cell, then spots in sub-base of 6–5 followed by a spot in 4 set well in, spots in 3 to hind margin increasing in size, ovoid to quadrate in shape; all spots orange-tawny. The postdiscal spots are, three subapical in a row, spot in 4 set well in, spots in 3–2 conjoined with discal marks with some dark scaling indicating line of fusion. Sometimes the orange spots in 4–6 are joined by rays. Hind wing ground colour as fore wing, but darker on the border which is wide: the discal band which is widest at the costa, tapers to the inner fold above the anal angle and is white with some blue, especially on the borders of the lower half; submarginal line of whitish lilac linear marks distinct and complete; border reddish above upper tail then olive to anal angle; margin black with white internervular fringe; tails long, upper 7 mm., lower slightly shorter. *Underside.* Ground colour clay-brown; black basal lines thin; discal and postdiscal bands of above well represented but as separate marks; dark submarginal marks in curve of wing rather indistinct except in lower half where the spots are black with a pale surround, mostly on the distal side. Hind wing slightly darker than fore; satiny sub-basal bar fore wing rather broken; the discal band of above well represented but narrower; postdiscal olive and maroon lunules not very distinct; submarginal row of linear marks, lilac and whitish, distinct and complete; submarginal border reddish above upper tail, then olive to anal angle. (Pl. 20, figs. 189, 190, type.)

*Variation. Upperside.* The conjoined discal and postdiscal orange band of fore wing more parallel-sided from 2–1a; the hind wing band slightly orange-scaled in outer mid area; the submarginal spots obscured in upper half but distinct in region of tails. *Underside.* With fore wing basal marks heavy. The discal band of hind wing silvery and extending through the inner fold. Postdiscal lunules strong, especially in lower portion.

Range: extending from the lower Meru (Mt. Kenya) area and the Njombe Range to southern Ethiopia, Mega and Neghelli to Dua River. (Map 6).

## ***Charaxes viola daria*** Rothschild

(Pl. 20, figs. 185–187)

*Charaxes etheocles daria* Rothschild, 1903 : 326.

*Charaxes etheocles chanleri* Holland; Rothschild, 1900 : 483. Males, Gillett Mts., Abyssinia (identified as *chanleri* Holland from Walenso, error!)

*Charaxes etheocles daria* Rothschild; Carpenter, 1935 : 360.

*Charaxes viola daria* Rothschild; van Someren & Jackson, 1952 : 264.

### GROUP 2, AREA 4. EAST SIDE OF ETHIOPIAN RIFT

The only authentic female of this subspecies is black with white or creamy bands, as described hereafter.

MALE. Fore wing length 41–42 mm., shape falcate. *Upperside.* Ground colour black with very slight green sheen. Subcostal blue spots variable but usually with a blue spot at the end of the cell, one or two blue spots beyond, lower small, two subapical whitish or bluish and small;

marginal glaucous lunules well separated, often small or only just indicated. (In two specimens the subcostal spots are missing except for the upper subapical.) Hind wing black, no postdiscal greenish line as a rule but may be faintly indicated; submarginal whitish spots usually obscured in upper part but more distinct in region of tails; marginal border may be reddish or a mixture of reddish and greenish then olive to anal angle; margin black; tails short of about equal length 5-4 mm., black with olive mid line. *Underside.* Fore wing ground colour greyish brown with satiny bar in the cell, a bar through the disc and a patch at upper part of apex; black lines distinct but not heavy; postdiscal black line thin, then heavy at 1b; submarginal dark spots present but only black at tornus. Hind wing slightly more brownish, but satiny bars not strong; postdiscal line of olive and maroon lunules outlined in black, proximally, well marked; submarginal linear marks faint; marginal border narrow, reddish above upper tail then olive to anal angle. In some specimens the underside ground colour may be more uniform, the whole surface shiny, except in the curve of the fore wing which is browner.

Descriptions based on topotypical specimens from Gugura and Gillett Mts. (Pl. 20, fig. 187.)

FEMALE. Fore wing length 37 mm., shape slightly falcate. *Upperside.* Ground colour black with slight bluish sheen at base and along costa. Pattern: a small white spot in the cell (absent in the type). In the discal row two elongate spots between end of cell and postdiscal series, spot in 4 set well in, spots in 3 to hind margin increasing in size, first two rounded on inner end, that in 1b angled. Postdiscal spots, three in subapex in a row, spot in 4 set in, those in 3–2 free, or just touching discal spots. Hind wing ground colour brownish black at base fading to greyish on inner fold but border of wing black; discal band widest at costa tapers toward inner fold above anal angle; but there represented by a pale mark, the whole band white, slightly bluish on borders of lower half. Submarginal line of whitish marks complete and distinct; submarginal border reddish above upper tail then olive to anal angle; margin black. Tails, 7 mm. and 5 mm. *Underside.* Fore wing greyish brown, slightly browner on curve of the wing. Black marks at base fairly strong on inner border of discal band; discal band whitish; postdiscal spots well represented and outlined in black proximally with a black spot in 1b; submarginal dark spots distinct, increasing in size and blackness to double mark in tornus. Hind wing ground colour slightly browner, especially on distal border; basal black marks fine; discal band as above but slightly narrower, whitish and extending to inner fold; postdiscal line of lunules olive and maroon strongly indicated; submarginal line complete; marginal border as usual with black dots in area of tails and double at anal angle. (Pl. 20, figs. 185, 186, type.)

*Variation.* (a) *Upperside.* Very similar to foregoing but upper discal and postdiscal white marks larger, though lower discal marks are less wide but contiguous with postdiscal marks in 1a–1b. *Underside.* There is a corresponding difference.

*Variation.* (b) *Upperside.* Ground colour of both wings above browner; the discal and postdiscal white marks conjoined from 5 to 1b, but the lower part of the band hardly wider or less wide than in nominate form. *Underside.* Pattern is creamy, the black marks strong.

*Variation.* (c) A specimen which I place as this race differs in having the upperside ground colour of both wings almost black, the upper discal and postdiscal spots reduced in size, the lower marks narrower, all marks creamy. The hind wing band slightly narrowed and cream in colour; the submarginal linear marks obscured.

Through the kindness of Dr. Viette of the Paris Museum, I have now been able to examine the material collected by Ungemach.

There are six males which agree very well on the upperside with an equal series of topotypical males of *daria* from Walenso and Gillett Mts. On the underside they are also very similar, the only difference being that three of the Youbdo males are rather uniform on the underside, lacking any strong pattern, but this variation is also to be noted in other races of *Charaxes viola* such as *picta.*

The two females are extremely interesting. That identified as *daria* Rothschild differs from nominate *daria* by the upperside having a much narrower fore wing bar in 1a–1b, the mark in 2 more elongate-quadrate, the one above in 3 same shape but smaller, marks in 4–5 conjoined, those in 6 free, the subcostal-subapical mark also free; all marks from 2 to subcostal slightly creamy tinged. That stated to be near form *vansomereni* Poulton of *viola picta* has a very similar pattern on the upperside but the bars are broader in both wings, that of the hind wing especially so, being white with bluish borders; the fore wing spots conjoined to 6, orange-ochre in colour, thus very similar to form *vansomereni* of *viola picta*.

It would thus appear that the Youbdo aggregate may possibly intergrade with the *viola-picta* aggregate on the eastern Sudan border.

Ungemach records a female form like ♀ f. *vansomereni* Poulton as belonging to *daria*, but since his specimen came from Youbdo, west of the Abyssinia Rift in Walegga country, there is some doubt about its correct position.

Range: The type and topotypes are from the east side of the Abyssinian Rift from Jabalo, Gugura and Gillett Mts. at Walenso. This race seems to extend to the upper Schebeli on the east and to Adola on the west. (Map 6).

Records from Walegga (Ungemach & Carpenter) probably represent a mixed aggregate.

## ***Charaxes viola phaeus*** Hewitson

(Pl. 21, figs. 193–200)

*Charaxes phaeus* Hewitson, 1877 : 82.
*Charaxes phaeus* Hewitson; Trimen & Bowker, 1887 : 344.
*Charaxes phaeus* Hewitson; Butler, 1895 : 361.
*Charaxes etheocles phaeus* Hewitson; Rothschild & Jordan, 1900 : 488.
*Charaxes etheocles* ♀ f. *coryndoni* Rothschild, 1900 : 488.
*Charaxes viola phaeus* Hewitson; van Someren & Jackson, 1952 : 269.
*Charaxes viola phaeus* ♀ f. *vansoni* van Someren & Jackson, 1957 : 43.

### GROUP 3, AREA 1, SEE RANGE P. 148

In this group we find the first evidence of complete divergence amongst the female forms from a "*viola*-like" pattern to that of *phaeus*. But amongst the southern or typical *phaeus* we find a white-barred female form which resembles somewhat the female forms *daria*, *handari* and *achaemenesopsis* of northern races of *viola*. This form we named *vansoni*. In this subspecies also, one is faced with the fact that there are two environmental aggregates: (a) that of the southern areas (Beira-Transvaal–Rhodesia and part of Bechuanaland) in which *phaeus* and *vansoni* occur side by side, and (b) the aggregate of the northern range of *phaeus* (Malawi, Tanzania to the west side of Lake Victoria), in which only the form *phaeus* has been recorded.

One must assume that there is a genetical foundation to the dual female form in the south, and that the genes for *vansoni* are absent in the northern aggregate. We thus have what I have termed (for want of a better term) bio-ecological strains, in which ecological environmental conditions have played an important part.

### Subarea (a). SOUTHERN AGGREGATE OR NOMINATE

MALE. Fore wing length 27–30 mm., shape falcate. *Upperside.* Ground colour blue-black with greenish sheen at base of costa; blue spots limited to one at upper angle of cell, two spots beyond cell, upper large, lower small, two spots in subapex bluish or whitish; glaucous marginal lunules small, well separated. Hind wing ground colour black; some specimens with a varying amount of greenish lunules in the postdiscal line opposite tails; submarginal spots blue or bluish white, complete; marginal border narrow, greenish red above upper tail then olive to anal angle; tails short, 3–4 mm. *Underside.* Fore wing ground colour earthy grey-brown or even pinkish grey, very uniform and plain-looking, relieved slightly by usual satiny bars; black lines thin; submarginal dark marks in curve of wing present but slight, strongest at tornus. Hind wing ground colour as fore wing, satiny bars weak; postdiscal lunate marks faint narrowly reddish and olive; margin as usual.

Description based on topotypical specimens.

### ♀ form **phaeus** Hewitson, 1877 : 82

Fore wing length 33–34 mm., shape slightly falcate. *Upperside.* Basal triangle of fore wing pale blue with slight greenish sheen, or slightly violet-tinged in old specimens, the blue not reaching the end of cell but in its lower angle extending to the postdiscal line on the hind border; distal portion of wing black, paler toward the curve on outer border; subapical spots in postdiscal line large and whitish, spot below smaller, other spots faintly indicated and bluish reaching 1b. Hind wing mostly pale blue from base to postdiscal line, often with a dark spot at costa; border black, widest at upper part in 6–7 then tapering to anal angle; submarginal spots blue with white central dot; submarginal border reddish above upper tail then olive to anal angle; margin black, tails 7–5 mm. long. *Underside.* Fore wing ground colour pale greyish brown with a pinkish glaze overall, so that the satiny bars are obscured and the pattern subdued, the black marks, except the tornal black ones, hardly visible. Hind wing as fore, all marks subdued.

### ♀ form **coryndoni** Rothschild, 1900 : 488

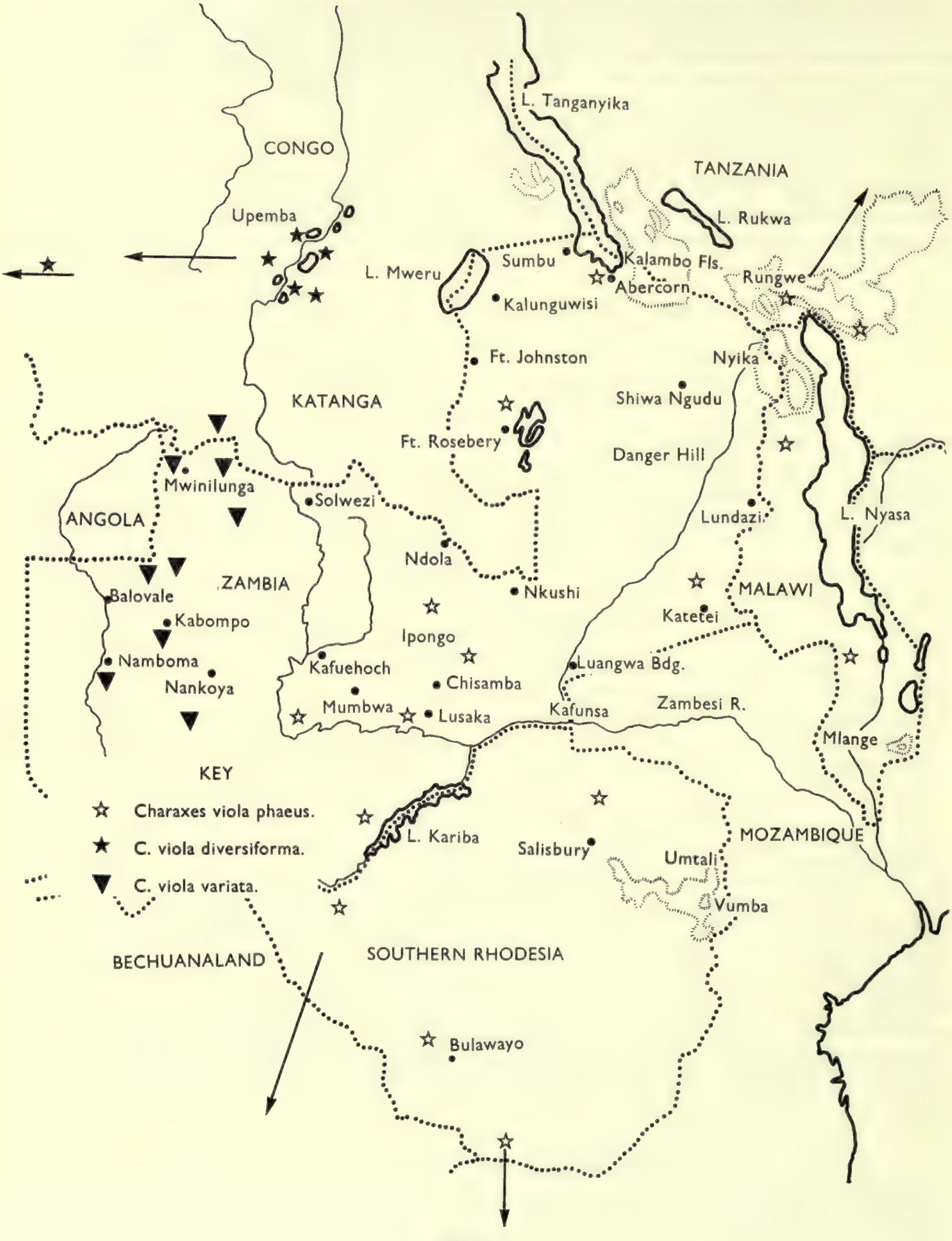
*Variation. Upperside.* Similar to *phaeus* but postdiscal spots of fore wing distinct to 1b; the blue of the hind wing often complete in costal area without any interruption.

### ♀ form **vansoni** van Someren & Jackson, 1957 : 43

Very similar to the white-barred forms in *viola kirki* or *viola suk.* Fore wing length 34 mm., shape falcate. *Upperside.* Ground colour of fore wing brownish at base but darker toward discal line and on outer border. Discal and postdiscal series of spots well apart except that the spots in 1b may touch. Hind wing ground colour brownish black at base, blacker on border; but paler on inner fold. Discal white band extending from costa, where it is widest, then tapering toward inner fold and there represented by a pale mark, the lower half of the band shaded with blue. Submarginal linear marks clear, lilac or bluish with white centres; submarginal border narrow above upper tail and dull reddish, then olive to anal angle; margin black; tails longish, 7–5 mm. *Underside.* Basal area of fore wing pale greyish shading to brownish toward the outer border, basal black marks thin but distinct; discal band well represented, creamy to ochre; postdiscal spots suffused over; submarginal brownish marks obscured though tornal black marks distinct. Hind wing marks obscured, the discal pale band slightly indicated at costal end. The whole underside with a satiny glaze. (Pl. 21, figs. 199, 200.)

### Subarea (b). NORTHERN AGGREGATE

Attention was drawn to this aggregate by van Someren & Jackson, 1957 : 44. We expressed the view that a satisfactory placing could not be made until material had actually been bred; unfortunately this has not been possible, but considerable additional material has been captured, especially in the Kigoma area north-east of Lake Tanganyika. These specimens bear out the observation that they are larger than nominate *phaeus* of southern regions and are rather more brownish below.


CONGO
Upemba
L. Tanganyika
TANZANIA
L. Rukwa
L. Mweru
Sumbu
Kalambo Fls.
Abercorn
Rungwe
Kalunguwisi
Ft. Johnston
Nyika
KATANGA
Shiwa Ngudu
Ft. Rosebery
Danger Hill
Mwinilunga
Solwezi
ANGOLA
Lundazi
L. Nyasa
Ndola
ZAMBIA
Nkushi
MALAWI
Balovale
Kabompo
Katetei
Ipongo
Namboma
Kafuehoch
Luangwa Bdg.
Chisamba
Nankoya
Mumbwa
Lusaka
Kafunsa
Zambesi R.
Mlange
KEY
☆ Charaxes viola phaeus.
★ C. viola diversiforma.
▼ C. viola variata.
L. Kariba
Salisbury
MOZAMBIQUE
Umtali
Vumba
BECHUANALAND
SOUTHERN RHODESIA
Bulawayo

Map 7.

### 3. ♀ form ***caerulescens*** van Someren & Jackson, 1957 : 45

### (Pl. 18, figs. 165, 166)

This is a development from the previous two forms toward form *phaeus* of *viola phaeus*. *Upperside*. The basal areas of both wings are an iridescent greenish blue sharply defined distally. The fore wing discal spots missing and the postdiscal series represented by two large subapical spots and obscured spots in 4–2. *Underside*. Red-brown with strong lilac bloom overall, thus pattern obscured. This is rather a small form, fore wing length 33 mm.

### 4. ♀ form ***albocaerulea*** van Someren & Jackson, 1957 : 45

### (Pl. 18, figs. 159, 160)

A development from form 2. *Upperside*. The bases of both wings pale blue, that of fore wing whitish in distal area in 1a–1b. and part of the enlarged discal blue spots; the postdiscal spots large and white in subapical area, but blue from 5–1b. Hind wing blue not reaching the costa but here represented by a separate blue mark. *Underside*. Less reddish brown, more greyish than previous form, with a stronger pattern visible especially on the distal borders of both wings.

### 5. ♀ form ***albimacula*** van Someren & Jackson, 1957 : 45

### (Pl. 18, figs. 161, 170)

*Upperside*. Represents a development from form 4 in the direction of a white-barred form, but retaining the blue scaling at the bases of both wings. The fore wing discal spots are white, two large spots beyond end of cell, an obscure spot at base of 4, spots from 3 to 1b increasing in size. Postdiscal spots are: two subapical, white, rest from 4 to 1b smaller and that in 1b bluish. Hind wing discal band widest at costa is whitish, strongly suffused with blue on lower half, *Underside*. Rusty brown but discal band of fore and hind wing visible.

### 6. ♀ form ***ochremaculata*** van Someren & Jackson, 1957 : 45

### (Pl. 18, figs. 167, 168)

*Upperside*. Bases of both wings brownish with strong blue to greenish scaling. Fore wing with a large ochre spot in the cell, discal and postdiscal spots ochreous, well separated up to 2 then fused in 1a, 1b forming a large mark tinged with ochre distally and greenish proximally. Hind wing band widest at costa and extending toward inner fold, white in middle but borders suffused with greenish blue. *Underside*. Greyish brown, rusty on borders but with satiny sheen overall but not obscuring the bars of above, these are strong and ochreous in colour.

### 7. ♀ form ***diversiforma*** van Someren & Jackson, 1957 : 44

### (Pl. 18, figs. 162, 169)

In the type, the spots on the upperside of fore wing are separated to area 2 and then conjoined. In the specimen here figured, the discal and postdiscal tawny orange spots are conjoined from 4 to hind margin. The hind wing band, widest at costa, is creamy, tinged greenish blue on borders.

strong; discal white bar strong, distally bordered with black especially in subcostal area; postdiscal zigzag reddish and olive lunules present but strongest in lower half toward anal angle; submarginal lunules well marked and with black distally to double dots in anal angle; border reddish above upper tail then olive to anal angle.

Holotype female. ZAMBIA: 60 miles on Mwinilunga to Kabompo Rd., 1-5.vi.1963 (*C. B. Cottrell*).

*Variation.* Fore wing length 34 mm. *Upperside.* Ground colour and general pattern similar to nominate form but all white marks larger and the basal areas of both wings more shaded with pale blue, increasing in intensity at discal row of spots fore wing and on borders of hind wing discal band. *Underside.* Very similar to nominate form. The interesting feature in this variety is the blue suffusion over the bases of the wings.

### ♀ form ***tricolor*** forma n.

*Upperside.* Ground colour rather blacker than in nominate form with a strong greeny blue sheen at base, more strongly blue on proximal border of fore wing discal spots in 1a–1b.

General pattern of fore wing as in nominate form but all spots orange-ochre to orange, slightly paler to whitish on inner half of marks in 1b. Hind wing ground colour black with strong greenish blue on proximal border of discal band, which is white in the upper half. *Underside.* Rather darker in ground colour than nominate form, with all marks other than black lines, white and in strong contrast. (Pl. 19, figs. 183, 184.)

Holotype female. Same data as holotype female *variata*.

### ♀ form ***rosella*** forma n.

*Upperside.* Ground colour similar to nominate form, fore wing with a curved white bar extending from the costa at and beyond the cell end to hind margin; spot in 2 a long triangle; spots beyond cell free; postdiscal spots limited to three subapical and one each in 4–3. *Underside.* Fore wing presenting a strong replica of the upperside pattern with submarginal pale and dark marks strong. Hind wing discal band strong in upper half but narrower and irregular in 3–2, widening again toward inner fold. Postdiscal zigzag line of lunules strong, ochreous at costal end but lilac and maroon to anal angle and outlined in black; submarginal pale line well marked with large bluish spots, black-centred in region of tails. (Pl. 19, figs. 175, 176.)

Holotype female. Same data as previous forms.

### ♀ form ***cottrelli*** forma n.

This interesting form exhibits a transition toward the form *phaeus* of *viola phaeus*.

*Upperside.* Basal areas of fore wing including the discal line in 1a–1b, greenish blue; the disc of the hind wing also blue, the rest of the wing black. Fore wing with discal spots, two beyond cell, spot in 4 set well in, all white; spots in 3–2 larger and slightly blue, spot in 1b merged into blue of base; postdiscal spots, three in subapex white, spot in 4 set in, followed by ochreous spots in 3–1b. Hind wing basal area and discal patch greenish blue represented at costa by a blue quadrate mark; extreme base slightly dark-scaled; submarginal linear marks bluish white, black distally, very strong; marginal border reddish above upper tail, then olive to anal angle. (Pl. 19, figs. 177, 178, type.)

*Variation. Upperside.* Very similar to form *rosella* but basal blue areas inclining to whitish in lower discal line 1–1a–1b. Upper discal spots in cell and in 3 ochreous, that in 2 blue. Postdiscal spots three in subapex, upper two white, lower ochreous, followed by less distinct spots in 4–3 also ochreous but spots in 2 and 1b bluish, the lower one contiguous with blue in discal line. Hind wing basal areas and disc blue, but not reaching the costa, here represented by a free blue mark. Submarginal line of linear marks, bluish white and strong, margined distally in black; marginal border as usual. *Underside.* Ground colour earthy brown with rusty purplish tinge; pattern not very strong but tornal black marks heavy.

Holotype female. ZAMBIA: Mankoya, 10.xii.1955 (*C. B. Cottrell*).

Range: This race is known from the N.W. regions of Zambia from Mwinilunga area and at Kabompo and Mankoya thus mostly between the upper Zambesi and its tributary, the Kabompo River. (Maps 6, 7).

## GROUP 4, AREA 2. S. KATANGA, CONGO

## *Charaxes viola diversiforma* van Someren & Jackson

(Pl. 18, figs. 157–172)

*Charaxes viola diversiforma* van Someren & Jackson, 1957 : 44–46.

MALE. Fore wing length 36 mm., shape falcate, but less so than *variata* or *picta*, and larger than either; in size and general appearance more like *kirki*. *Upperside.* Ground colour fore wing blue-black, with slight greeny sheen at base of costa and cell. Pattern: a trace of a blue spot in the cell, two blue spots beyond, the upper large; two whitish or ochre-tinged spots in subapex, sometimes a third small dot; traces of blue spots in 4–3. Glaucous marginal lunules ill-defined, separated by dark veins. Hind wing blue-black, duller on inner fold; a greenish wavy line in postdiscal zone most distinct opposite tails; submarginal row of bluish white spots complete; submarginal border slightly reddish green above upper tail then olive to anal angle; margin black, tails rather short, of about equal length 5–4 mm. *Underside.* Ground colour earthy brown; pattern rather obscured, the satiny bars indistinct and the black marks thin on both wings. (Pl. 18, fig. 172.)

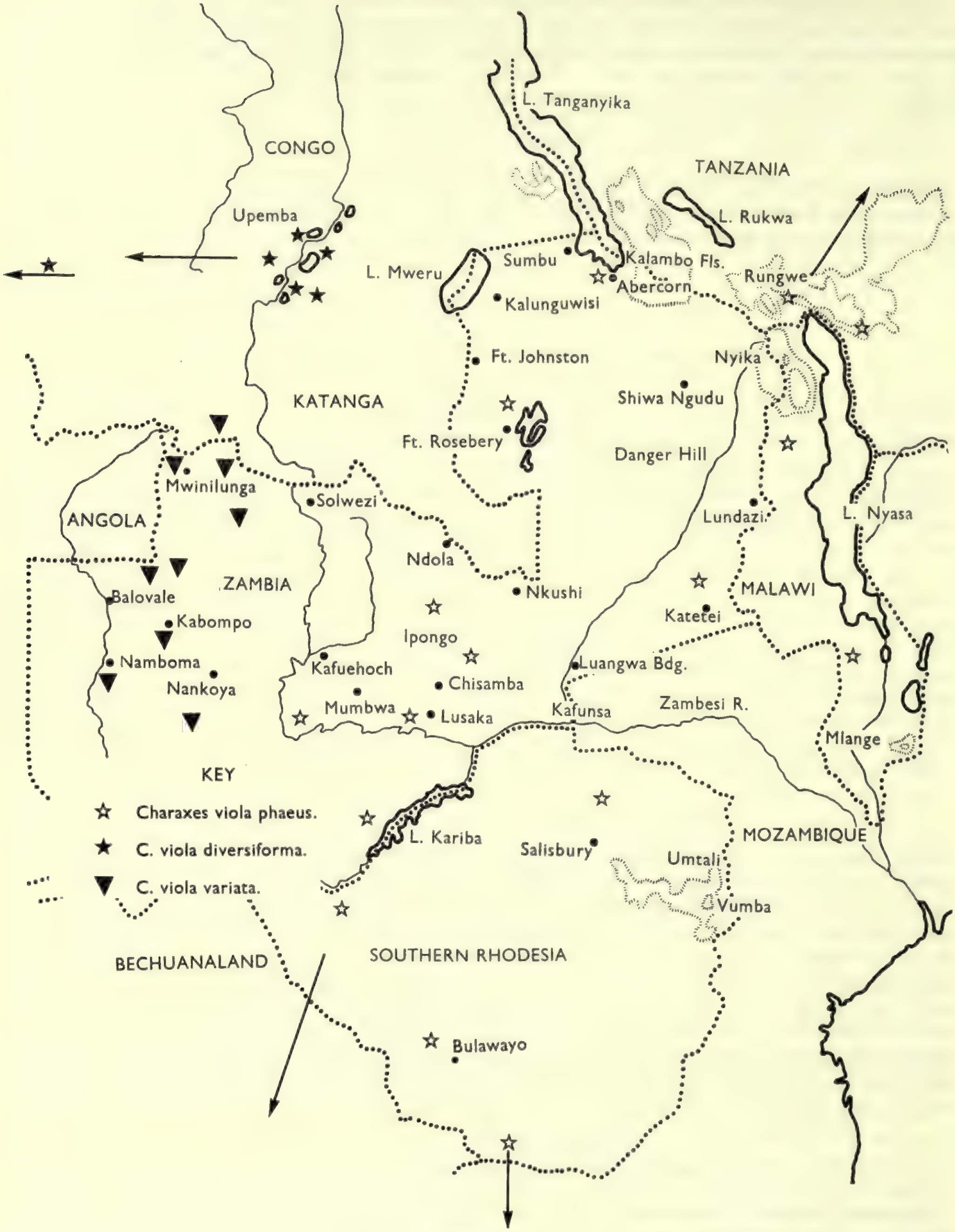
Females very variable, the following forms have been named:

### 1. ♀ form ***purpurea*** van Someren & Jackson, 1957 : 45

Fore wing length 34 mm., shape falcate. *Upperside.* Ground colour purplish black with strong bluish green sheen at bases of wings. This form bears a superficial resemblance to *Charaxes virilis* Rothschild but differs in having both a discal and postdiscal series of bluish spots, the two upper subapical whitish. Marginal glaucous lunules slightly developed. Hind wing basal area suffused with purplish green, distal border black carrying an irregular postdiscal greenish band; submarginal row of whitish lilac linear marks complete and clear; marginal border as usual. Tails thin, 6–4 mm. long. *Underside.* Strongly rusty brown, more rusty on outer border of fore wing; slight indication of satiny bars in sub-base and through disc. Hind wing ground colour as fore wing, all black marks very fine; postdiscal line of lunules present but suffused over with a golden rusty bloom; submarginal spots lilac but obscured; marginal border very narrow and indistinct. (Pl. 18, figs. 157, 158.)

### 2. ♀ form ***viridicaerulea*** van Someren & Jackson, 1957 : 45

*Upperside.* Differs from form 1 in lacking the discal blue spots other than the one beyond end of cell; the postdiscal series rather stronger and extending to the hind border in line with the more pronounced postdiscal bar in the hind wing. The basal areas of both wings iridescent greenish blue. *Underside.* Red-brown with rusty golden bloom obliterating all pattern except the tornal black spot of fore wing. (Pl. 18, figs. 163, 164.)


L. Tanganyika
CONGO
TANZANIA
Upemba
L. Rukwa
Sumbu
Kalambo Fls.
L. Mweru
Abercorn
Rungwe
Kalunguwisi
Ft. Johnston
Nyika
KATANGA
Shiwa Ngudu
Ft. Rosebery
Danger Hill
Mwinilunga
Solwezi
Lundazi
L. Nyasa
ANGOLA
Ndola
ZAMBIA
Nkushi
MALAWI
Balovale
Kabompo
Katetei
Ipongo
Namboma
Luangwa Bdg.
Kafuehoch
Nankoya
Chisamba
Mumbwa
Lusaka
Kafunsa
Zambesi R.
Mlange
KEY
☆ Charaxes viola phaeus.
★ C. viola diversiforma.
▼ C. viola variata.
L. Kariba
Salisbury
MOZAMBIQUE
Umtali
Vumba
BECHUANALAND
SOUTHERN RHODESIA
Bulawayo

Map 7.

### 3. ♀ form ***caerulescens*** van Someren & Jackson, 1957 : 45

### (Pl. 18, figs. 165, 166)

This is a development from the previous two forms toward form *phaeus* of *viola phaeus. Upperside.* The basal areas of both wings are an iridescent greenish blue sharply defined distally. The fore wing discal spots missing and the postdiscal series represented by two large subapical spots and obscured spots in 4–2. *Underside.* Red-brown with strong lilac bloom overall, thus pattern obscured. This is rather a small form, fore wing length 33 mm.

### 4. ♀ form ***albocaerulea*** van Someren & Jackson, 1957 : 45

### (Pl. 18, figs. 159, 160)

A development from form 2. *Upperside.* The bases of both wings pale blue, that of fore wing whitish in distal area in 1a–1b. and part of the enlarged discal blue spots; the postdiscal spots large and white in subapical area, but blue from 5–1b. Hind wing blue not reaching the costa but here represented by a separate blue mark. *Underside.* Less reddish brown, more greyish than previous form, with a stronger pattern visible especially on the distal borders of both wings.

### 5. ♀ form ***albimacula*** van Someren & Jackson, 1957 : 45

### (Pl. 18, figs. 161, 170)

*Upperside.* Represents a development from form 4 in the direction of a white-barred form, but retaining the blue scaling at the bases of both wings. The fore wing discal spots are white, two large spots beyond end of cell, an obscure spot at base of 4, spots from 3 to 1b increasing in size. Postdiscal spots are: two subapical, white, rest from 4 to 1b smaller and that in 1b bluish. Hind wing discal band widest at costa is whitish, strongly suffused with blue on lower half, *Underside.* Rusty brown but discal band of fore and hind wing visible.

### 6. ♀ form ***ochremaculata*** van Someren & Jackson, 1957 : 45

### (Pl. 18, figs. 167, 168)

*Upperside.* Bases of both wings brownish with strong blue to greenish scaling. Fore wing with a large ochre spot in the cell, discal and postdiscal spots ochreous, well separated up to 2 then fused in 1a, 1b forming a large mark tinged with ochre distally and greenish proximally. Hind wing band widest at costa and extending toward inner fold, white in middle but borders suffused with greenish blue. *Underside.* Greyish brown, rusty on borders but with satiny sheen overall but not obscuring the bars of above, these are strong and ochreous in colour.

### 7. ♀ form ***diversiforma*** van Someren & Jackson, 1957 : 44

### (Pl. 18, figs. 162, 169)

In the type, the spots on the upperside of fore wing are separated to area 2 and then conjoined. In the specimen here figured, the discal and postdiscal tawny orange spots are conjoined from 4 to hind margin. The hind wing band, widest at costa, is creamy, tinged greenish blue on borders.

### 8. ♀ form ***cupreopurpurea*** van Someren & Jackson, 1957 : 45

(Pl. 18, fig. 171)

*Upperside.* Ground colour brownish black with a strong purplish sheen overall, so that the discal and postdiscal spots which are entirely separate are coppery coloured. Hind wing ground colour brownish black with strong purplish gloss, the discal band greenish blue with dyslegnic borders.

The foregoing descriptions are based on paratypes (kindly loaned by the Tervuren Museum) and are complementary and supplementary to the original descriptions of the types.

Range: All material of this subspecies has come from the Upembe area of S. Katanga of the Congo; Upembe, Lulua, and Kafskumba. (Maps 6, 7).

## ***Charaxes viola loandae*** **ssp. n.**

(Pl. 17, figs. 145–152)

GROUP 4, AREA 3. N.W. ANGOLA

This subspecies presents features which suggest a parallel evolution to that of *diversiforma*, and might even be considered identical to that race but for the fact that the males differ as do the females.

MALE. Fore wing length 28–31 mm.; shape falcate. *Upperside.* Ground colour blue-black with slight greenish sheen at base of fore wing. Blue spots limited to one blue spot in the cell, one large spot and a dot below beyond cell end, two subapical spots bluish white and blue; glaucous marginal lunules with central white mark complete from subapex to tornus. Hind wing ground colour black with a trace of a wavy greenish line in postdiscal zone; submarginal whitish spots large and distinct in type, (or may be small); marginal border largely reddish to anal angle, or ochreous with some reddish to anal angle; edge black, with white fringe between veins distinct; tails short, 5–4 mm. long. *Underside.* Very similar to that of male *phaeus*, pale greyish brown with satiny bars very faint, black marks thin, but tornal black mark strong. Hind wing ground colour as fore wing, the postdiscal line visible but not strong; pale submarginal line indistinct; marginal border narrowly red and olive to anal angle. (Pl. 17, fig. 150.)

Female forms very variable, the following are named:

### 1. ♀ form ***primitiva*** **forma n.**

(Pl. 17, fig. 152)

*Upperside.* Male-like, ground colour of fore wing blue-black with very strong greenish tone over basal area, blacker in disc, but greyer on border in curve of the wing. There is a blue spot in the cell, an indication of a spot in subcosta beyond the cell; the postdiscal series of blue spots from subapex to 2 rather indistinct; marginal lunules glaucous but diffuse. Hind wing black, strongly suffused over with bluish green, bordered in discal line with stronger bluish green bar complete from costa to above anal angle; submarginal white spots distinct; marginal border mostly reddish and mixed with olive toward anal angle. Tails thin, upper 6 mm., lower 5 mm. *Underside.* Ground colour pale rusty brown with a strong purplish bloom overall;

satiny bars obscured; black lines faint but those in 1b fore wing stronger though tornal mark is weak.

### 2. ♀ form ***basiviridis*** **forma n.**

(Pl. 17, fig. 151)

Somewhat like form 1 but differing as follows: *Upperside.* Ground colour black but bases of both wings more strongly green and limited to basal triangles. Fore wing with two white subapical spots, rest in postdiscal line blue and hardly visible. Marginal lunules ill-defined. Hind wing postdiscal wavy greenish line stronger; submarginal row of spots greenish; marginal border a mixture of reddish and green scales. *Underside.* As in form 1.

### 3. ♀ form ***violitincta*** **forma n.**

(Pl. 17, fig. 145)

*Upperside.* Ground colour black, base of fore wing violet-blue to discal line at 1a–1b, but fading out at costa at mid cell, discal bar represented by paler blue diffuse spots increasing in size from 3 to hind margin; margin of wing slightly brownish but lunules not definite. Hind wing slightly brownish at the base, but disc of wing with a large violet patch not reaching costa but here represented by a free spot; submarginal linear blue marks distinct; marginal border a mixture of bluish and ochre then olive to anal angle. *Underside.* Very similar to previous forms but black marks stronger and the tornal spot blacker.

### 4. ♀ form ***vansonoides*** **forma n.**

(Pl. 17, fig. 149)

*Upperside.* A transitional form toward form *vansoni* of *viola phaeus*; and somewhat like form *albimacula* of *viola diversiforma* but without any blue at bases of wings, these areas being black with a strong green sheen. The discal and postdiscal fore wing spots large; the margin of fore wing with indistinct brownish lunules. Hind wing base black with slight green sheen; discal band white, widest at costa, strongly suffused with greenish blue on outer border; submarginal linear marks bluish white, well developed; marginal border reddish above upper tail, ochreous olive to anal angle. *Underside.* Ground colour as in previous forms but white areas of upperside pattern apparent though narrower and ochreous in colour.

### 5. Nominate ♀ form ***loandae*** **forma n.**

(Pl. 17, fig. 146)

*Upperside.* Basal areas of fore wing brownish, with purplish sheen; pattern as in form 4 but all spots tawny orange, slightly bluish in 1a. Hind wing basal area brownish with strong blue sheen in side light; discal band white, extending from costa to above anal angle, strongly blue-scaled on the borders especially in lower half; submarginal linear marks bluish white and strong; marginal border reddish above upper tail, then mixed olive and reddish to anal angle.

### 6. ♀ form ***protokirki*** **forma n.**

(Pl. 17, fig. 148)

*Upperside.* Fore wing basal area brownish black with strong purplish sheen, darker toward the inner border of the discal band and on border of wing, but margin rusty brown; discal and postdiscal spots orange with indications of joining rays between spots in 2–4. Hind wing basal area brownish black with purplish blue sheen; discal band, widest at costa, is here orange, then shades to ochre and whitish toward inner fold above anal angle, the outer border with strong blue scaling. Submarginal bluish white linear marks strong; marginal border reddish above upper tail then olive to anal angle. *Underside.* Purplish brown, black marks in fore wing distinct, the tornal black spots strong. Pattern of upperside represented below but slightly reduced and rusty ochre in colour.

### 7. ♀ form ***instabilis* forma n.**

### (Pl. 17, fig. 147)

*Upperside.* Somewhat like form of the nominate *diversiforma*, but base of fore wing paler brownish with some green scaling; discal and postdiscal orange spots fused from 5 to hind margin but with some indication of dark scales in line of fusion to 2. Margin of wing rusty. Hind wing basal area light brown with purply greenish sheen; discal band broad, widest at costa and slightly ochre-tinged here, but whitish suffused with blue at lower half; border black with submarginal bluish white linear marks well developed; marginal border reddish above upper tail then reddish mixed with olive to anal angle. *Underside.* Rusty greyish; basal black marks thin; pattern of upperside only slightly represented.

Range: The series of *viola loandae*, from which the foregoing forms have been selected for description, was bred in the Dundo area near Loanda in the north west district of Angola. The food plant was not specified. (Maps 6, 7).

### Biological note

Many of the races have been bred on the following food plants:—

*Charaxes viola picta*: Uganda and N.W. Kenya, *Albizia coriaria*, *Albizia gummifera*, *Albizia* sp. (*sassa* auct.), *Entada abyssinica*, *Entada sudanica* (Leguminosae).
*Charaxes viola kirki*: Kenya and Tanganyika; *Albizia schimperiana*, *Albizia adianthifolia* (*Al. fastigiata* auct.), *Entada leptostachya*, *Acacia mellifera*.
*Charaxes viola suk*: Karamoja, Suk, Kamasia: *Acacia mellifera*, *Albizia coriaria*, *Albizia* sp. indet.
*Charaxes viola phaeus*: Transvaal: *Acacia caffra*.

I have conducted experiments to try and find out the degree of possible interchange of food plants, with little success.

a. Newly hatched larvae from eggs laid on *Entada* sp. (Uganda) refused to feed on *Entada abyssinica* (Kenya);
b. Larvae first fed on *Albizia coriaria* (Uganda) refused to feed on *Albizia schimperiana* (Nairobi, Kenya).
c. Larvae from eggs laid on *Acacia mellifera* either refused to feed on *Albizia schimperiana*, or those that did so, died in the next two instars;
d. Captive females, caught in *Acacia mellifera* country where they were seen laying on this plant, refused to lay on fresh foliage of *Albizia schimperiana*, but when foliage of *Acacia mellifera* was supplied, they laid readily. But when the newly hatched larvae were placed on *Albizia schimperiana* and *Al. gummifera*, few survived to pupate.

I am of the opinion that, in the case of *Charaxes viola*, selection of food plant by the female is an important factor in the build-up of localized strains. The degree of discrimination is often rigid.

The fact that these food plants grow in different ecological environments has brought about a restrictive choice of habitat, which almost amounts to a form of ecological barrier between groups of the same species; and this has given rise to certain morphological characters such as size, coloration and pattern. Cf. *viola picta/viola suk*; *viola suk/viola kirki*.

### ***Charaxes viola brainei*** van Son[1]

(Pl. 17, figs. 153–156)

*Charaxes ephyra* Godart; Trimen, 1891 : 80.
*Charaxes viola brainei* van Son, 1966 : 3.

I have only been able to examine a single pair of this new subspecies, kindly presented to the B.M. (N.H.) by the collector. From this meagre evidence, I am unable to check on the characters claimed for this race, or to evaluate the statement that this is the only form of female occurring in the northern area of S.W. Africa.

Range: Apparently confined to S.W. Africa, Kombat area. (Map 6).

### SYSTEMATIC LIST

### ***Charaxes viola*** Butler

*Charaxes viola viola* Butler, 1865. Type locality: " W. Africa ". Range: Senegal to N. Nigeria and Lake Chad (?).
- *viola picta* van Someren & Jackson, 1952. Type locality: Uganda, Unyoro, Kitanwa. Range: S. Nigeria, Cameroon, then skirting north of equatorial forest to E. Congo, Uganda, S. Sudan, and N.W. Kenya.
- ♀ f. *vansomereni* Poulton, 1925. Type locality: Uganda, Kampala, Bugala.
- *viola kirki* Butler, 1881. Type locality: Tanzania, Momboia. Range: N. and Central Tanzania and along coast to north of Ruvuma River. Kenya, along coast and inland Ukambani, Masai Country, Kikuyu area, Nairobi, Thika, Fort Hall, Sagana and Nyeri.
- ♀ f. *albifascia* Poulton, 1925. Type locality: Kenya, Teita Hills, Dabida.
- ♀ f. *rogersi* Poulton, 1919. Type locality: Kenya, Teita Hills, Dabida.
- ♀ f. *handari* Poulton, 1925. Type locality: Tanzania, nr. Mvumi.
- *viola suk* Carpenter & Jackson, 1950. Type locality; Kenya, Suk, Kacheleba. Range: N. and Central Kenya.
- ♀ f. *kirkoides* Carpenter & Jackson, 1950. Type locality: Kenya, Suk, Kacheleba.
- ♀ f. *achaemenesopsis* Carpenter & Jackson, 1950. Type locality: Kenya, Suk, Kacheleba.

---

[1] On map 6, the author's name is wrongly spelt as "van Som".

♀ f. *intermedia* Carpenter & Jackson, 1950. Type locality: Kenya, Suk, Kacheleba.

♀ f. *albifascia* Poulton, 1926. Type locality: Kenya, Teita Hills, Dabida.

*viola chanleri* Holland, 1895. Type locality: Mt. Kenya, Njombeni Range. Range: Mt. Kenya to S. Ethiopia.

*viola daria* Rothschild, 1903. Type locality: Ethiopia, Jalalo-Gugura. Range: east side of Ethiopian Rift.

*viola phaeus* Hewitson, 1877. Type locality: Mozambique, Delagoa Bay. Range: Southern aggregate, Mozambique to Transvaal, E. Bechuanaland, Rhodesia and S.W. Zambia, S. Malawi, Tanzania, east side of north end of Lake Nyasa.

♀ f. *coryndoni* Rothschild, 1900. Type locality: Upper Zambezi, Gazungula.

f. *vansoni* van Someren & Jackson, 1957. Type locality: Transvaal, Malta Forest, Pietersburg Dist. (♂ Holotype), Transvaal, Pretoria (♀ Allotype).

Northern aggregate, N. Malawi and Tanzania, S. Highlands, east side of Lake Tanganyika to S.W. Lake Victoria at Geita and Kitigati on Kagera R. (Tanzania to Uganda border).

*viola variata* ssp. n. Type locality: Zambia, 60 miles on Mwinilunga–Kabompo Rd. Range: N.W. Zambia.

♀ f. *tricolor* forma n. Type locality: Zambia, as nominate form.

♀ f. *rosella* forma n. Type locality: Zambia, as nominate form.

♀ f. *cottrelli* forma n. Type locality: Zambia, Mankoya.

*viola diversiforma* van Someren & Jackson, 1957. Type locality: Lulua, Kapanga. Range: Congo, S. Katanga, Upembe area.

♀ f. *purpurea* van Someren & Jackson, 1957. Type locality: Lulua, Kapanga.

♀ f. *viridicaerulea* van Someren & Jackson, 1957. Type locality: Lulua, Kapanga.

♀ f. *caerulescens* van Someren & Jackson, 1957. Type locality: Lulua, Kapanga.

♀ f. *albocaerulea* van Someren & Jackson, 1957. Type locality: Katanga, Lupweshi R.

♀ f. *albimacula* van Someren & Jackson, 1957. Type locality: Katanga, Kafakumba.

♀ f. *ochremaculata* van Someren & Jackson, 1957. Type locality: Lulua, Kapanga.

♀ f. *diversiforma* van Someren & Jackson, 1957. Type locality: Katanga, Kafakumba.

♀ f. *cupreopurpurea* van Someren & Jackson, 1957. Type locality: Lulua, Kapanga.

*viola loandae* ssp. n. Type locality: N.W. Angola, Dundo area, nr. Loanda. Range: N.W. Angola.

♀ f. *primitiva* forma n. Type locality: N.W. Angola, Dundo area nr. Loanda.

♀ f. *basiviridis* forma n. Type locality: As above.
♀ f. *violitincta* forma n. Type locality: As above.
♀ f. *vansonoides* forma n. Type locality: As above.
♀ f. *loandae* forma n. Type locality: As above.
♀ f. *protokirki* forma n. Type locality: As above.
♀ f. *instabilis* forma n. Type locality: As above.
*viola brainei* van Son, 1966. Type locality: S.W. Africa, Kombat. Range: north east of S.W. Africa.
[2]

## 9. *CHARAXES CYNTHIA* BUTLER

The species was described by Butler in 1865, based on a male taken in Ashanti, Ghana. He subsequently placed other material from Cameroon and N. Angola as this same species without comment. This lead was followed by other writers and has given rise to some confusion.

When Rothschild discussed the species in 1900, he pointed out that there appeared to be two distinct aggregates or subspecies, the nominate of the W. African regions, Sierra Leone to the Niger, the other occupying the area Cameroon, Congo to Unyoro in Uganda. He set out the differences between the two very clearly, but he refrained from giving a name to the latter group because of lack of female material.

Subsequent writers appear to have overlooked Rothschild's comments or did not agree with them. Thus we find that:

In 1912, when Grünberg reported on the Grauer collection from Central Africa, he described *Charaxes cynthia* ab. *mawamba* from the country west of Lake Albert, in N.E. Congo [not in Uganda], thus from the central African region as defined by Rothschild.

In 1920, Holland refers to the material collected by the American Museum Expedition at Medje, N.E. Congo, as *cynthia* Butler, without further comment.

In 1923, Le Cerf describes a female from Cameroon as *cynthia*, form *albofascia*. Thus he assumes that Cameroon examples are typical *cynthia cynthia* Butler. He however separates insects from Kindu, Upper Lualaba River, in the Kivu Province of eastern Congo as *cynthia kinduana*, thus distinguishing them from Cameroon specimens which he took to be nominate *cynthia* Butler.

In 1926, Lathy described *cynthia*, ab. *cizeyi*, which he compares with " forme typique " [*sic*]. His example came from S. Cameroon. In the same paper he described *cynthia parvicaudatus* from Mabira Forest, Uganda, which he compares with examples from " d'afrique occidentale " [*sic*].

In 1928, Talbot described *cynthia sabulosus*; the type being a " dry " form and the paratype a " wet " form, both taken in September; the type from Kinda, Kafakumbo, Katanga, S.E. Congo (*Overlaet*) " distinguished by its paler brown colouration "; he did not state with what he compared it.

In 1933 Le Moult described *cynthia guineensis* from Karouane, French Guinea. Said to have been taken further north than other described races of *cynthia*. The description agrees with examples of the nominate race from Liberia, Sierra Leone and Ghana.

---

[2] *viola fagini* Storace. Type locality: Eritrea. No material available for examination. Original description unsatisfactory. On map 6 this name is wrongly spelt "figini".

In 1934 Rousseau-Decelle described a male from Etoumbi, French Congo (Central African Republic) as form *angusticlavius*. He also described *cynthia sabulosus* f. *aurantiaca*, from Kafakumbo, Katanga. Thus he recognizes the validity of that subspecies, but his specimen is an extreme " dry " form.

## *Charaxes cynthia cynthia* Bulter

(Pls. 22–27)

*Charaxes cynthia* Butler, 1865 : 625.
*Charaxes lysianassa* Westwood, 1874 : 181.
*Charaxes guineensis* Le Moult, 1933 : 16 **syn. n.**

MALE. Fore wing length 38–39 mm. Costa curved from mid-third to apex, outer border incurved at 3–4, hind angle projecting slightly at 1b. *Upperside.* Base of wing and costa to end of cell, rufous chestnut, discal zone of wing black with extensions toward costa at end of cell, the black forking at 4 and extending toward costa and enclosing two elongate rufous marks at mid-point 5–6 in discal line; fore wing bar rufous orange, extending from costa at subapex as spots of increasing size to hind margin, these spots to 2 usually free, rather ovoid in shape, those of 1a–1b larger and fused; there may sometimes be a suggestion of contiguous rufous spots proximal in 2–3 in discal line. Apex and border of wing black, with marginal rufous internervular spots largest at 1b. Hind wing basal area brownish black; disc of wing crossed by an orange ochreous bar, paler, more orange than bar in fore wing, extending from costa, where it may be even paler, toward the inner margin, usually almost parallel-sided, with slightly stronger rufous on distal border; postdiscal black band extending from costa to 2 and tapering to anal angle, 6 mm. wide at 6, even on inner border but slightly dentate at upper end; border rufous orange 3–4 mm. wide, tapering at anal angle; margin black with slight interrupted white fringe most evident at anal angle and slightly serrate; tails thin of about equal length 4–5 mm. long, mostly black, rufous at base. *Underside.* Fore wing ground colour purplish or vinaceous brownish grey, paler more shiny bars in subcostal area separated by rufous wavy bars; postdiscal row rufous shaded, paler creamy proximally in 1a–1b, followed by a row of lilac-grey lunules in the submarginal zone, rather quadrate in subapex, contiguous in 1b and touching the tornal angle black mark; black marks sub-basal in 1b and 2 conspicuous as separate or fused irregular strong marks. Hind wing ground colour as fore wing, wavy rufous lines in basal area with paler lines in between; discal silvery creamy bar complete from costa to above anal angle, may be uniform in width 3 mm. wide, or narrower followed by a series of rufous and greyish lunules, with larger rufous spots distally. Submarginal row of lilac-grey and rufous lunules conspicuous, olive at anal angle with two black dots; margin narrowly black. (Pl. 22, figs. 201, 204, 202, 205.)

*Variation.* There is some slight difference in intensity of the black and rufous coloration especially in the fore wing, between fresh and partly worn examples as is to be expected, and the underside also exhibits this. The main characteristics of this race are unaffected. " Seasonal " forms do not seem to occur.

FEMALE. Considerably larger than the male, and paler; fore wing length 44–47 mm. *Upperside.* Costa, cell area and base rufous orange, with black mid area as in the male with some extensions of the black into the cell, the black area beyond the cell with two rufous elongate spots in the discal line; pale bar orange-ochre with a rufous flush over upper spots, spots more elongate than in the male; marginal rufous spots more conspicuous, in the black border of wing. Hind wing pattern as in the male, but discal band wider, pale orange-ochre with rufous on outer border tapering and crossing the inner fold; black border slightly variable in width, even on inner border, slightly dentate on outer where it meets the marginal rufous orange border; extreme margin black; tails long and thin 7–6 mm. *Underside.* Pattern much as in the male but light areas larger, the fore wing pattern divided into a basal and sub-basal area with heavy black marks to discal line; discal series of spots fused with those of the postdiscal in 1b–2, the remaining postdiscal spots free up to subapex, creamy in colour; double triangular black mark at tornus, points toward border, remaining spots to apex less strong bordered distally with greyish rufous lunules; margin with rufous lunules interrupted by dark veins. Hind wing pattern as in the male, but pattern bolder, rather variable in width, 5–7 mm.; the discal bar narrower than above but edged distally with ochreous lunules, large in upper sector but thin toward inner margin, distally bordered with stronger rufous marks; submarginal row of lilac-grey and rufous lunules distinct; extreme margin black; margin slightly serrate. (Pl. 22, fig. 203, 206.)

Range: French Guinea, Liberia, Sierra Leone, Ghana and Nigeria, west of the Niger River. To the east it meets the next race. (Map 8).

## *Charaxes cynthia cameroonensis* ssp. n.

(Pl. 27, figs. 237–242)

*Charaxes cynthia* f. *albofascia* Le Cerf, 1923 : 367.
*Charaxes cynthia* ab. *cizeyi* Lathy, 1926 : 93–94.
*Charaxes cynthia* f. *angusticlavius* Rousseau-Decelle, 1934 : 231.

I may be criticized for introducing an entirely new name for the mid-African race of *cynthia*. I do so because, as indicated in the general introduction, there has been much confusion between this aggregate and nominate *cynthia* in the past. The three names mentioned above have all been given to forms or aberrations, so called, names which have no standing and are not recognized under the Code.

MALE. Fore wing length 42–43 mm., thus larger than *cynthia cynthia*, and more heavily marked. *Upperside*. Fore wing, the basal rufous chestnut is more intense as a rule, and the black areas more solidly black especially in the area beyond the cell, thus almost obliterating the rufous marks. The postdiscal bar, made up of a series of spots of increasing size from subapex to hind margin, may show a trace of discal marks fused with the postdiscal in 2-1b., all marks strong rufous orange. The marginal rufous internervular marks strongest at the tornus, each with a slight white fringe. Hind wing basal area black with chestnut bloom especially toward costa; the discal band, slightly variable in width is strong rufous orange, as dark as the fore wing bar; clear-cut on the inner border more dyslegnic on the outer and tending to become suffused toward the inner fold; black band slightly varying in width, widest at upper sector, tapering towards anal angle with outer edge rather serrate where it adjoins the rufous orange border, which is black on the edge with very slight white fringe. Tails slightly shorter than in nominate subspecies, sharply pointed, 4 mm. long, rufous in colour slightly margined in black. *Underside*. General pattern similar to that of nominate subspecies but not so strong, in the upper half of the fore wing, the discal-postdiscal lunules more suffused over, but whitish in 1a–1b but these in the basal half may be as strongly black and rufous. On the hind wing the silvery white line, though slightly variable, is on the whole narrower than in the western race. The base of the costa in all races is white. (Pl. 27, figs. 239, 242).

### ♂ form **angusticlavius** Rousseau-Decelle, 1934 : 231

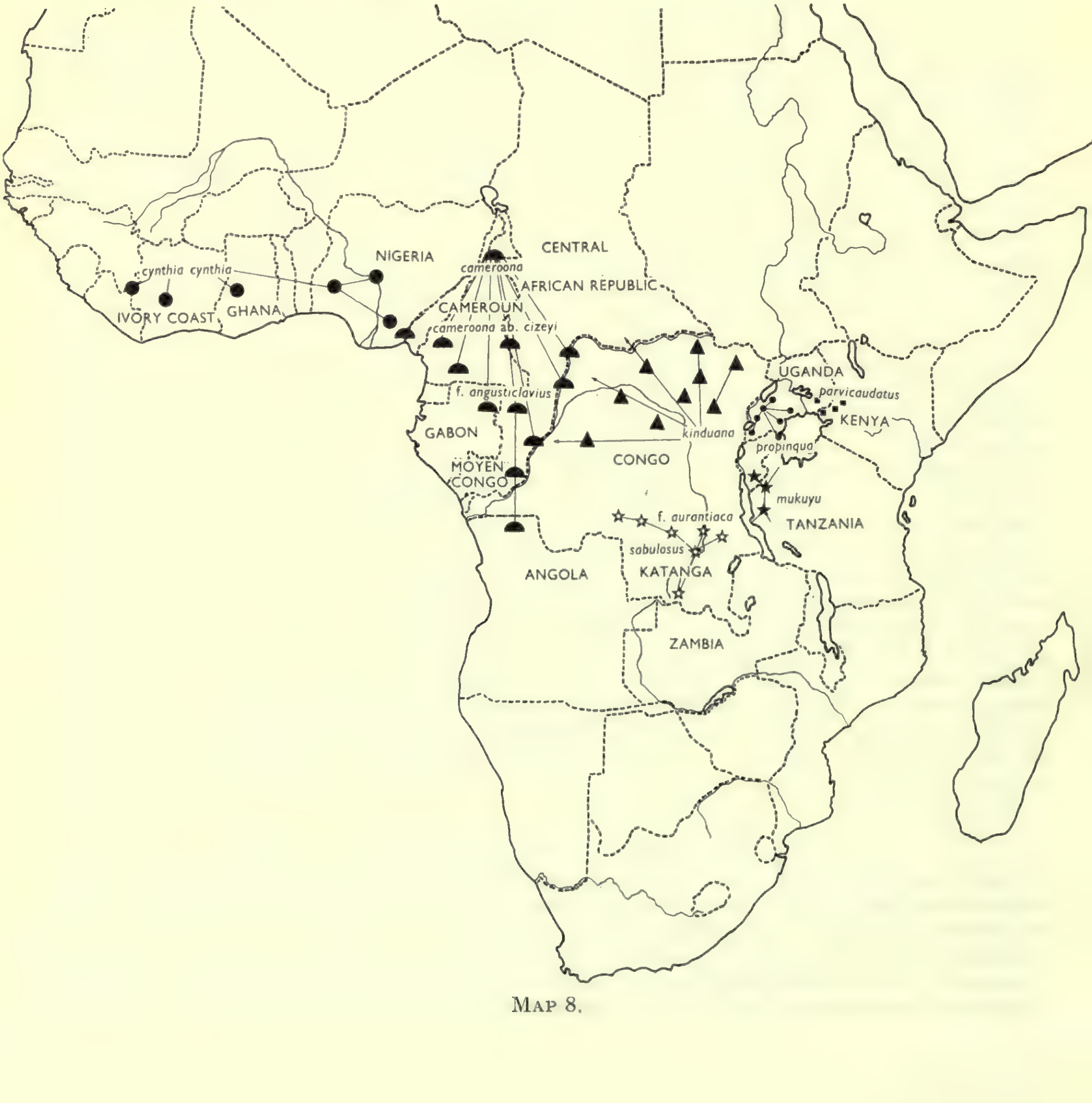
This is an extreme form, small in size, with the upperside rather dark in ground colour on both fore and hind wings, with the strong rufous orange bars of the wings reduced in width. The underside is also unusually dark, but the silvery discal line in the hind wing narrow but well marked.

FEMALE. On an average larger than *cynthia cynthia*, fore wing length 45–46 mm. *Upperside*. The basal rufous chestnut rather darker; the median black area tending to reduce or almost obliterate the subcostal marks beyond the cell; the disco-postdiscal bar slightly narrower but strongly marked, creamy or creamy ochreous; marginal rufous marks strong to moderate. The hind wing band is generally narrower, creamy ochreous in colour; the black border beyond correspondingly broader, the outer border strongly dentate with the black extending along the veins into the rufous orange marginal border, which is narrowly black on the edge; tails long and thin. *Underside.* Pattern essentially similar to that of nominate *cynthia* but bolder, the discal and postdiscal pale marks of the fore wing and the discal band on the hind wing paler, more creamy, and more strongly marked. (Pl. 27, figs. 237, 238, 240, 241.)

*Variation.*

(a) The female figured on Pl. 27, figs. 237, 238, is the type of ab. *cizeyi* Lathy and conforms with the majority of females of this subspecies.

(b) Another female would appear to agree with *albofascia* Le Cerf. This has the fore and hind wing bars pale creamy to whitish.


cynthia cynthia
IVORY COAST
GHANA
NIGERIA
CENTRAL
AFRICAN REPUBLIC
cameroona
CAMEROUN
cameroona ab. cizeyi
f. angusticlavius
GABON
MOYEN CONGO
CONGO
kinduana
UGANDA
parvicaudatus
KENYA
propinqua
mukuyu
TANZANIA
f. aurantiaca
sabulosus
KATANGA
ANGOLA
ZAMBIA

Map 8.

(c) A few females exhibit a degree of partial " melanism "; the bars of the fore wing and the band on the hind wing are more strongly orange and dusted over with brownish scales. The underside is not greatly affected, but in the specimen from Moyen Congo the submarginal and marginal lunate pale marks are exaggerated.

Although I have linked the specimens of the Central African Republic and Moyen Congo with the Cameroon subspecies, since the majority in the aggregates agree, one finds some degree of variation in all three areas.

Range: Cameroon (and adjacent eastern S.E. Nigeria where there is some contact with nominate *cynthia*) to Central African Republic (French Congo), the Moyen Congo to the Congo River basin; making some contact with *kinduana* in west central Congo. (Map 8. On this map the specific name is given in error as " cameroona ".)

### ***Charaxes cynthia kinduana*** Le Cerf

(Pl. 26, figs. 231–236)

*Charaxes cynthia kinduana* Le Cerf, 1923 : 366.
*Charaxes cynthia*, ab. *mawamba* Grunberg, 1912.

Through the kindness of Dr. P. Viette of the Paris Museum, I have obtained a photograph of the type of *kinduana* Le Cerf. This depicts a very dark specimen which appears to be semi-melanistic; the black area of the fore wing is more extended than usual, occupying the basal half of the wing with the exception of the cell area; the usual subcostal rufous spots are entirely obliterated; the postdiscal series of spots are reduced in size and thus well separated to 2 and dark rufous; the marginal spots absent except at the tornus. The hind wing band is reduced in width, the upper marks well separated and darker brownish rufous; the marginal border is narrower and darker. *Underside.* Pattern of both wings is obscured except for the black marks at the base of the fore wing and the pale area in 1a–1b; the hind wing pattern obscured except for the conspicuous silvery white discal line which is very narrow.

Since the type specimen appears to be abnormal, it becomes difficult to assess what are the normal characteristics of this race. The position is further complicated in that in 1912 Grünberg described what he called *cynthia* ab. *mawamba* from what is generally accepted to be the same ecological area whence came the type of *kinduana* Le Cerf. The description of *mawamba* agrees more closely with the general run of males of this area than does that of *kinduana*. The description which follows is based on material from the eastern Congo.

MALE. Fore wing length 44–45 mm. *Upperside.* General pattern as in the more western ssp. *cameroonensis*, but basal rufous colour slightly paler, the subcostal rufous spots distinct though small, (slightly obscured in some specimens); the disco-postdiscal rufous orange spots separated from subapex to 3, the rest to hind margin larger and conjoined, with some indication of discal marks in 2–3; marginal rufous spots present but most distinct at the tornal angle. Hind wing basal area brownish black, paler on inner fold; discal band widest at costa 5–6 mm. then tapering rather strongly toward, but not reaching the inner fold; black band thus wider at costal end, and tapering toward anal angle; rufous orange marginal border wider, edged narrowly with black. Tails 4 mm. *Underside.* Very similar to *cameroonensis* but rather less strongly marked with rufous on the fore wing, black marks rather overshadowed by darker ground; hind wing white bar somewhat variable in width; postdiscal rufous lunules, with dark band distally, show up plainly; submarginal row of pale marks indistinct; margin rufous. (Pl. 26, figs. 231, 234, type.)

Female. In general pattern and colour somewhat similar to nominate *cynthia* but pale bars on fore and hind wing narrower. Fore wing marginal rufous spots strong; disco-postdiscal bar rufous orange, rather narrow. Hind wing discal band rufous orange, widest at costa, and tapering at 2 to above anal angle, slightly dentate in 4 on outer border; the black postdiscal band widest at 4–6, dentate on outer border and invading the rufous orange border along veins; margin narrowly black; tails longish, thin, upper 6 mm., lower 4 mm. *Underside.* Ground colour vinaceous grey with a rufous flush. Fore wing chestnut bars distinct but narrower; disco-postdiscal spots creamy ochre, more whitish in lower half flanked by black lines proximally and by the black tornal spots distally, the other submarginal dark dots to subapex more diffuse. Hind wing band more creamy ochre, clear-cut on inner border but merging into the postdiscal greyish and rufous lunules distally, the latter strongly marked; submarginal lunules large; marginal rufous orange border distinct. (Pl. 26, figs. 232, 235, 233, 236.)

Range: eastern Congo from the Kivu Province area along the Lualaba River to Stanleyville, Medje, Avikuba–Aruwimi, extending westward to the mid Congo basin, and eastward to the Semliki Valley. (Map 8).

## ***Charaxes cynthia parvicaudatus*** Lathy

(Pl. 24, figs. 215–222)

*Charaxes cynthia parvicaudatus* Lathy, 1926 : 94.

Male. Fore wing length 35–40 mm., thus rather smaller than other races so far mentioned. *Upperside.* General pattern basically similar, but differing as follows: rufous areas at costa and base of fore wing paler; the black mid area represented in the cell by an almost free mark; the two rufous spots in discal line, beyond, usually distinct; the rufous orange bar with the subapical and other spots to 4 completely free, the spots of increasing size, those of 2–3 showing some indication of fusing with trace of marks in discal line, the mark in 1b more quadrate, that in 1a a streak, but the whole bar is relatively narrow. Marginal rufous marks small and indistinct except the double one at the tornus. Hind wing basal area rather more brownish, darkening to almost blackish at the discal band; the discal band is narrow, 5 mm. at the costa, irregularly parallel-sided and stopping short of the inner fold, rufous orange in colour, slightly paler at costa. The black postdiscal band is thus wide, fairly even on inner border but serrate on outer margin invading the outer border along the veins, this border rufous orange with slight black edge. Tails stumpy, 2–3 mm. long, mostly rufous. *Underside.* Ground colour as in most other races, but with a rusty bloom overall, the rufous pattern less strong, but black marks in 1b well developed; the disco-postdiscal series of pale spots rather obscured in upper portion but whitish in 1b; the black tornal triangles not very heavy. Hind wing pattern not strong in the basal area; the white bar narrow, clear-cut on inner border, more diffuse on outer where it merges into the inner row of postdiscal lunules; a series of white dots in submargin at apices of marginal lunules which are not usually strong; border rufous. (Pl. 24, figs. 215, 216, 219, 220.)

Female. *Upperside.* In general appearance resembling somewhat the females of *cynthia cameroonensis* in respect to the pale bars through the wings. Fore wing length 45–46 mm.; basal rufous area at 1a–1b and over cell rather paler; the ochreous spots at the end of the cell and in the discal line, distinct and elongate, the upper postdiscal spots, rounded or elongate, the remaining spots in this line increasing in size and fused with spots in the discal line which may be rudimentary or of equal size, the mark in 1b rather quadrate. Marginal rufous marks large and conspicuous. Hind wing basal area brownish; the discal band rather parallel-sided up to cell area then tapering to inner fold, creamy ochreous in colour; the distal black band wide, more or less straight on the inner side but serrate on the distal, with strong projections along the veins into the rather narrow rufous marginal border; edge narrowly black; tails relatively short, upper rather spatulate at end 6 mm. long, lower shorter, more stumpy 4 mm. *Underside.* Conforming to the general tone of the ground colour of the male; the disco-postdiscal spots forming the bar in the fore wing clearly indicated, creamy in colour; the black marks in 1b often strong and conjoined. The hind wing band creamy, strongly defined on inner border, less strong on outer where it merges with the inner lunate pale marks of the postdiscal zone, the adjacent brownish rufous zone rather well marked; the submarginal pale marks flanked proximally with rufous triangles; border rusty brown. (Pl. 24, figs. 217, 218.)

*Variation.* In some specimens the rufous areas of the fore wing may be dusted over with brownish scales; the marginal spots obscured. On the hind wing, the rufous marginal border reduced in width.

Specimens from N.W. Kenya in the Kakamega-Kaimosi forests belong to this aggregate. (Pl. 24, figs. 221, 222.)

Range: eastern Uganda, especially in the Mabira Forest and adjacent forest areas extending eastward in the forests of N.W. Kenya, Kaimosi-Kakamega-Nandi. (Map 8).

## *Charaxes cynthia propinqua* ssp. n.

(Pl. 23, figs. 209, 210, 213, 214)

This aggregate combines the features of *parvicaudatus* as regards shape and more particularly the very short tails, with the eastern Congo subspecies *kinduana* with regard to colour and pattern of the fore wing on upper side.

MALE. Fore wing length 36–38 mm. *Upperside.* Fore wing pattern bolder than in *parvicaudatus*, base of wing and costa rufous slightly more extended; the subcostal rufous spots in discal line and those of the postdiscal row larger throughout but more especially in the hind half of the bar; the rufous marginal spots larger and more pronounced. The hind wing discal band is wider, thus reducing the black band beyond; the marginal rufous border is wider. *Underside.* Fore wing pattern very similar to *parvicaudatus*, in general tone; black marks at base of 1b confluent, thus large and conspicuous; the hind wing white bar is narrow and more defined on both borders, the pattern is otherwise very similar. The tails are extremely short and stumpy. (Pl. 23, figs. 209, 210, type.)

FEMALES. The characteristics of the male reproduced in the female: fore wing length 45–47 mm. *Upperside.* Basal area bright rufous; rufous spots beyond cell and those in discal line usually bolder; the upper postdiscal spots large, those of 3 to hind margin large and fused with the discal spots so that the fore wing bar is wider; the marginal rufous spots bold. Hind wing band wider from costa to 2, the black band thus reduced in width; marginal rufous border wider than in *parvicaudatus*; tails thinner, upper 6 mm. lower 4 mm. with a slight upward kink as in *parvicaudatus*. *Underside.* Very similar to *parvicaudatus* in the fore wing; on the hind wing the white bar is more defined. (Pl. 23, figs. 213, 214, type.)

Holotype male. UGANDA: Katera Forest, Masaka, xi. 1953 (*van Someren*).
Allotype female. Same data.

Range: From the forests of western Uganda, Bwamba, Toro, Bugoma, Budongo, to the forests west of Lake Victoria in the Masaka district, Katera, and north of the Kagera River. (Map 8).

## ***Charaxes cynthia sabulosus*** Talbot

(Pl. 25, figs. 223–230)

*Charaxes cynthia sabulosus* Talbot, 1928 : 229.
*Charaxes cynthia sabulosus* f. *aurantiaca* Rousseau-Decelle, 1934 : 231.

Specimens of *cynthia* from the Katanga area present a rather puzzling picture for it would appear that the species is here subject to " seasonal variation " [*sic*] producing so-called " wet " and " dry " forms. This gives rise to some difficulty in determining the characteristics of the subspecies as a whole. In the original description Talbot states " a well defined race from Katanga "; but the description is involved since it concerns two specimens, the type and a paratype which are slightly different. I have before me a small number of topotypical specimens which exhibit marked variation, in both sexes. It seems desirable therefore to quote the original description of the type.

Fore wing length 40 mm., " distinguished by its paler brown coloration on both sides. Fore wing above with the postdiscal brown band of spots continuous to cellule 7, the spots above vein 4 larger than in typical form, and spots in 2 and 3 not invaded by the ground colour . . . Band of the hind wing broader than in typical form, being extended distad. Brown scaling in the cell more marked than in typical form . . . Underside with the dark brown markings obsolete and black spots smaller. . . . The white band on the hind wing is sharply defined along both its edges. . . ."

Type ♂, Kinda, Katanga (*Overlaet*).

The characters of the paratype are: " the marginal spots [f.w.] are merged together to form a continuous broad marginal line . . . the hind wing cell is strongly brown. . . . The white band of underside only reaches to just below vein 2."

I have before me two topotypical males taken by Overlaet at Kafakumba, Katanga. One is described as a " dry form ", the other as a " wet form ".

" Dry form ": *Upperside*. Fore wing rufous. Coloration extends along the costa, over the whole cell and slightly beyond and in the bases of 1a–1b and slightly in 2–3 so that the black mark at end of cell is entirely free. The black median band is thus narrow, but the two upper rufous spots in the discal line are large and free. The rufous orange bar is continuous from 7 to the hind margin, the spots increasing in size, those in 2–3 with slight indication of remnants of discal marks. The rufous marginal marks bold. The hind wing discal band is moderately broad, 6 mm. at costa, almost parallel-sided, tapering out at vein 2; black band widest at 5–6, even on inner edge, slightly serrate on outer; rufous border rather wide; tails thin, upper 7 mm., lower 5 mm. *Underside*. Vinaceous grey-brown, rufous basal bars not strong; black sub-basal marks in 1b relatively small, tornal mark moderate; pattern of disco-postdiscal bar rather obscured. Hind wing with most of the pattern obscured except that of the white discal line which is narrow but strong, clearly defined on both edges, and almost straight. (Pl. 25, figs. 229, 230.)

" Wet form ": *Upperside*. Fore wing basal rufous coloration rather darker and slightly less extensive; black median zone considerably wider, the two subcostal spots in the discal line almost obscured; distally, the band encroaches onto the upper postdiscal row of spots which are considerably smaller, so that the whole bar is narrower and darker rufous than in the " dry " form; the rufous marginal spots are very small, except those at the tornal angle. The hind wing basal area darker; the discal band narrow and stops short at 2; the black band wider than in the " dry " form so that the rufous marginal border is restricted in width. *Underside*. Ground colour slightly darker, but the pattern is stronger.

Both these specimens were taken in September. According to Chapin, the rainy season in Katanga is October to May, the dry from June to September.

A further dark form, " wet " presumably, was taken at Kindo, Katanga, in April. *Upperside.* In general appearance it resembles the previous specimen, except that the rufous subcostal spots are obscured to a greater degree; the postdiscal bar narrower in 1a–1b; the marginal spots slightly more developed. In the hind wing the discal band is rather narrower and constricted in 6. *Underside.* Very similar to the previous specimen. (Pl. 25, figs. 223, 224.)

### form ***aurantiaca*** Rousseau-Decelle, 1934 : 231

### (Pl. 25, figs. 227, 228)

In sharp contrast to the two foregoing, we have the very " dry " male form described by Rousseau-Decelle and named *aurantiaca* which also came from Kafakumba in Katanga. No date of capture is mentioned for any of the three examples cited.

MALE. *Upperside.* Pale rufous orange on costa, the cell and just beyond, the bases of 1a–1b, slightly in 2–3, thus enclosing the black mark at end of cell which is entirely free; there are two spots beyond the cell in the discal line; the postdiscal bar consists of a small subcostal spot, then a series of larger spots increasing in size to the streak in 1a, the bar is wider than in other forms and pale rufous orange; margin with large conspicuous marks from apex to hind angle. Hind wing basal area rufous slightly darker at base of 6, discal band light rufous orange, pale at costa but darkening in 2 and along the outer border; black band, comparatively narrow irregular on both sides; marginal border wide, pale rufous orange. Tails as in other specimens. *Underside.* Vinaceous grey with rusty suffusion, the pattern almost obsolete even to the dark marks in 1b. The hind wing basal area almost uniform followed by a distinct narrow white bar stopping short at 2, the remainder of the pattern obscured, except for a series of pale rounded marks in submargin. (Pl. 25, figs. 227, 228.)

FEMALE. The female does not seem to have been described and the only one available to me appears to belong to the " wet " form. *Upperside.* Fore wing rufous basal area extending over the cell and slightly beyond with only slight rufous tinge at base of 1b; the black spot at end of cell almost free. Fore wing bar rather wide since the upper spots of the postdiscal line are large with gradual increase in size to hind margin, spots in 2–3 with slight conjoined marks of the discal line, the spots of this line in 5–6 well developed, large. The marginal lunules large and distinct. Hind wing basal area brownish, more rufous toward inner fold; discal band almost uniform in width from costa to 2 then tapering to inner fold above the anal angle. Black band moderately broad, even on inner side very slightly dentate at upper part on distal side; marginal border fairly wide with very narrow black edge; upper tail robust with rounded end 6 mm., same colour as border, lower tail of about same length, darker, thinner, bluntly pointed; anal angle with two white dots. *Underside.* Fore wing basal area vinaceous grey with rufous bars and black marks strong; disco-postdiscal bar fairly clearly indicated, creamy, but whitish in 1a–1b; submarginal pale marks with dark spots proximally fairly strong; marginal lunules well represented. Hind wing ground colour as fore wing in basal area but dark lines strong, especially that adjoining the discal white bar which is thus defined on the inner edge but rather merging with the irregular lunules on the distal side; dark brownish band strong, less so on outer edge where it abuts onto the marginal rather ill-defined pale lunules; border narrowly rufous. (Pl. 25, figs. 225, 226.)

From the above descriptions it will be noted that the subspecies *sabulosus* is represented by a rather mixed aggregate, with combined features which separate it from other races.

Range: All the specimens I have seen and those on record appear to have been taken in the Katanga area of S. Congo, at Kinda, Kafakumba and Thisboba so that its wider range is thus unknown. (Map 8).

### *Charaxes cynthia mukuyu* ssp. n.

(Pl. 23, figs. 207, 208, 211, 212)

The series of specimens on which this race is based represent one of the most distinctive subspecies of *cynthia*. In some respects it resembles the race *sabulosus* but is easily distinguishable both above and below. It is characterized by the great reduction of the black areas on the upper side of both fore and hind wing; the paler more orange of the rufous areas. On the underside, the pattern is suppressed, including the white bar on the hind wing which, in some specimens is almost vestigial; in such cases there is in fact a slight resemblance to *Charaxes buetti macclounii*.

MALE. Fore wing length 39–40 mm. *Upperside*. Costa and basal area bright rufous orange extending well beyond the end of the cell, the basal areas of 1a–1b, 2 and 3, the black mark at end of cell much reduced to an inverted comma; the black central band thus much reduced in width; the two subcostal marks in the discal series large, quadrate and contiguous, with clear indication of spots in 2–3, the latter often free, and an indication of black in 1b showing line of junction of the marks in this area; the postdiscal spots from subcosta to 4 of about even size, those from 3 to hind margin increasing is size; the bar thus appears divided in upper sector; marginal spots usually fairly large especially at the tornal angle. Hind wing basal triangle rufous brown, slightly darker in mid area and where it meets the discal rufous orange band which is slightly expanded at the costa, more or less parallel-sided to above 2 where it tapers and fades out before reaching the inner fold. The black postdiscal band is reduced in width, widest in 6–7 where the outer border is serrate then tapering to above the hind angle, where, the lower spots may be free or slightly conjoined; the rufous orange marginal border is thus wide and very narrowly black-edged; tails short and pointed, of about equal length, 3–4 mm. *Underside*. Ground colour rather pale rufous ochreous with less vinaceous shade; the rufous bars finer and less obvious; the black marks less strong, but those in 1b often conjoined to form a rough oval; the tornal mark rather blurred. The disco-postdiscal pattern of spots not strong, though whitish in 1a–1b. On the hind wing the discal white line is thin and though dark edged on inner side may be much reduced; the postdiscal lunules, except toward anal angle obscured; pale submarginal lunules obscured; the rufous border not strong. (Pl. 23, figs. 211, 212.)

FEMALE. Fore wing length 42–44 mm. Basal area including the cell and base of 1b and slightly that of 2–3 bright rufous orange, extending beyond end of cell and here enclosing the black inverted " comma " mark as in the male. Mid bar narrow black and interrupted in base of 4 by a quadrate creamy ochre mark, part of the discal series which starts as two elongate quadrate marks in 5–6, represented in 3 by a crescentic mark, the lower mark fused with the postdiscal row of large creamy ochre marks extending to the hind margin in 1a; margin with conspicuous rufous marks which are almost contiguous. Hind wing basal triangle rufous brown, rather restricted owing to the width of the discal band which is almost parallel sided, but tapering to above the anal angle, the outer edge tinged with rufous; the black band narrow, constricted at costal end, outer border serrate at upper end, tapering to anal angle where there are two white dots. Marginal border rufous, wide, narrowly black edged; tails rather thin, upper 6 mm. lower 4 mm. slightly up-curved. *Underside*. General tone similar to that of the male; the fore wing rufous bars thin; the black mark sub-base in 1b an oval, the tornal mark moderately strong; the disco-postdiscal bars broad rather diffuse except in 1a–1b; margin diffusely rufous. Hind wing, basal area as fore, broad discal band sharp-cut on inner edge but diffuse on outer where it merges into the pale lunules which are only slightly visible, the dark band is outwardly edged with paler lunules; the border rufous, with two black spots in anal angle. (Pl. 23, figs. 207, 208.)

*Variation.* FEMALE. *Upperside.* Pattern for fore wing very similar to nominate *mukuyu* but basal rufous coloration darker; the black triangle at bases of 1a–3 broader at base. Disco-postdiscal series of creamy ochre marks as in the other female but broader; marginal lunules less defined. Hind wing basal are darker rufous brown; discal band wide, broadest at costa and tapering to above angle; the black band still narrow consisting of a series of contiguous oval black marks, small at costa, and extending to anal angle; rufous border broad; tails shorter. *Underside.* Ground colour as in other female but pattern stronger and more defined; this applies particularly to the creamy bands on both wings and especially to the hind wing where the postdiscal pale and rufous lunules are strong.

Holotype male. TANZANIA: Kigoma District, at Mukuyu Forest, v.1965 (Major *I. Grahame*), deposited in B.M. (N.H.)

Allotype female. Same locality, vii.1965.

Material examined, nine males and two females taken by African collector for Major Grahame and by the Japanese Primate Expedition. (Map 8).

## SYSTEMATIC LIST

### ***Charaxes cynthia*** Butler

*Charaxes cynthia cynthia* Butler, 1865. Type locality: Ashanti. Type in B.M. (N.H.) ♂.
= *lysianassa* Westwood, 1874. Type locality: Ashanti. ♀.
= *guineensis* Le Moult, 1933. Type locality: French Guinea. ♂.
Range: W. Africa, Guinea, Liberia, Ivory Coast, Ghana to Nigeria to Niger River.

*cynthia cameroonensis* ssp. n.
= ab. *cizeyi* Lathy, 1926. Type locality: Cameroon. ♀.
= f. indiv. *angusticlavius* Rousseau-Decelle 1934. Type locality: French Congo, Etumbi. ♂.
= f. indiv. *albofascia* Le Cerf, 1923. Type locality: Cameroon, Bitje. ♀.
Range: Cameroon rain forests, S.E. Nigeria, Central African Republic. Moyen Congo, west of Congo Basin.

*cynthia kinduana* Le Cerf, 1923. Type locality: E. Congo, Kinda on upper Lualaba River. Type in Paris Mus. ♂.
= ab. *mawamba* Grünberg, 1912. Type locality: eastern Congo, Awamba, west of Lake Albert; *en route* Awamba-Avukuba-Aruwimi.
Range: From the Kivu Prov. of eastern Congo, along the Lualaba River to Medje N.E. Congo, west to Congo Basin; east to Semliki Valley.

*cynthia propinqua* ssp. n. Type locality: Uganda, Katera Forest.
Range: W. Uganda, Toro forests, Bugoma, Budongo, Bwamba, Kalinzu, Katera, Entebbe.

*cynthia parvicaudatus* Lathy, 1926. Type locality: Uganda, Mulange, Mabira Forest.
Range: Uganda; Busoga, Mabira Forest, Jinja, Kenya; N.W. Kapwaren forests, Kaimosi, Kakamega, Kabras, Nandi, Kipkarren.

*cynthia sabulosus* Talbot, 1928. Type locality: Kinda, Katanga. ♂. Tervuren Mus.

f. indiv. *aurantiaca* Rousseau-Decelle, 1934. Type locality: Katanga, Kafakumba.

Range: Katanga, at Kinda, Kafakumba, Thisbobo. Upembe Park. lower Kasai.

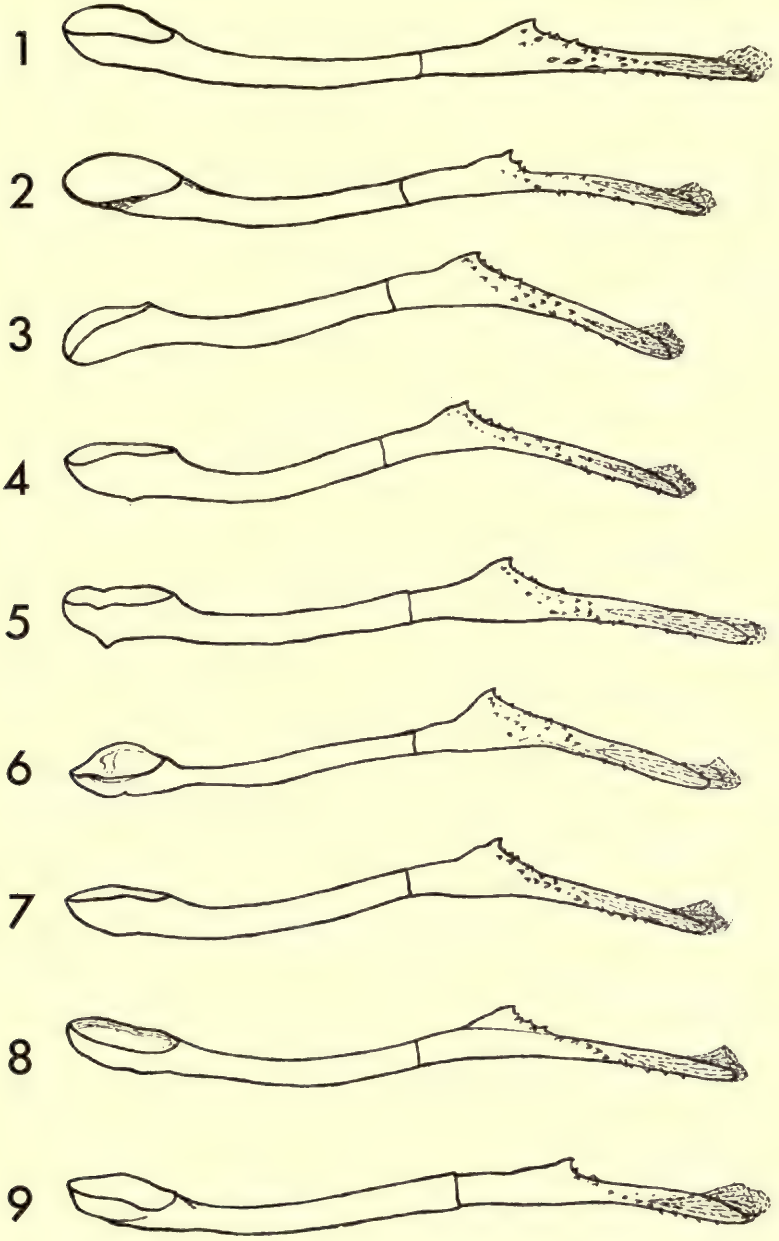
*cynthia mukuyu* ssp. n. Type locality. Tanzania, Kigoma, Mukuyu. Range: Tanzania, N.E. of Lake Tanganyika in the Kigoma district, at Mukuyu and Muhimo forests.

## ACKNOWLEDGEMENTS

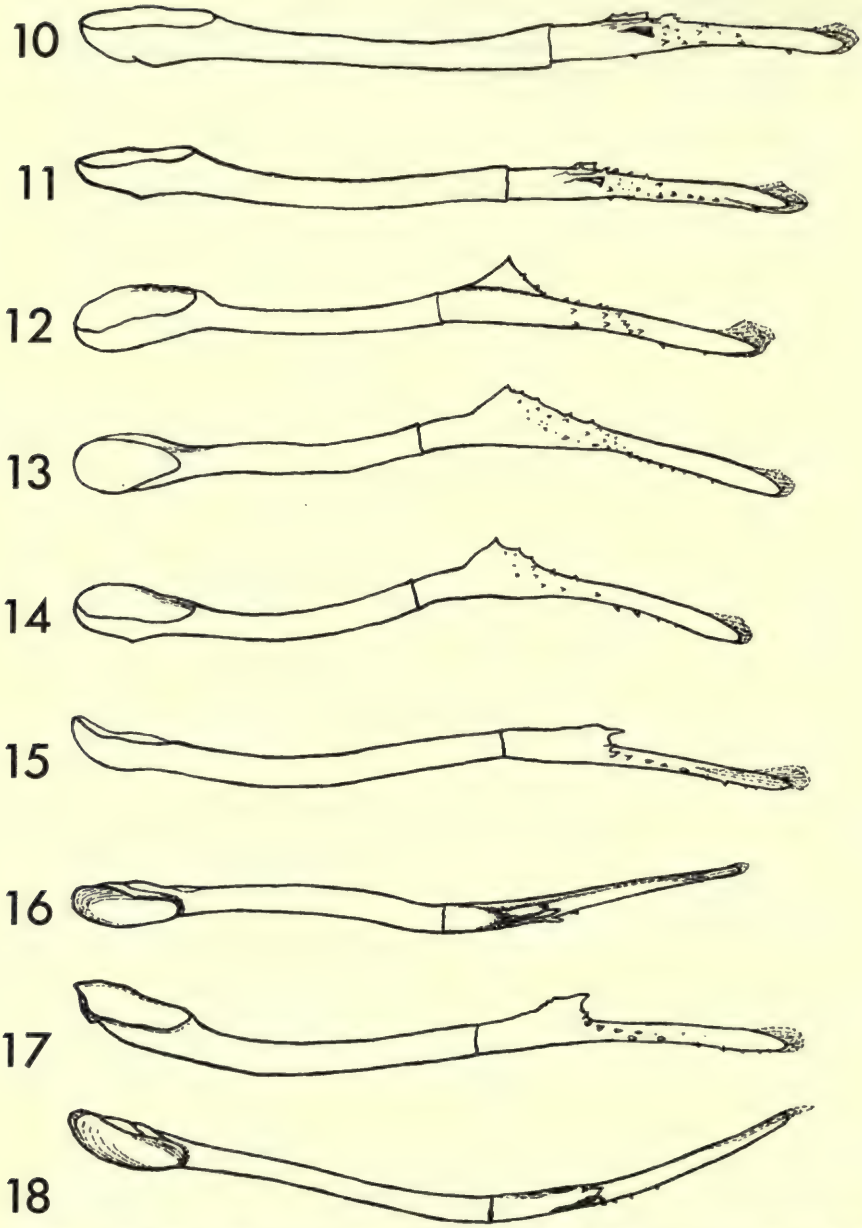
A vast amount of topotypical material was brought together for these revisional notes and I wish to acknowledge my indebtedness to the following for loan of material, photographs of types, etc. I offer my apologies to some contributors for retaining their material for such a lengthy period.

The staff of the Entomological Department, B.M. (N.H.), London; Mr. E. Taylor of the Hope Dept., University Museum, Oxford, England; Major Iain Grahame, Lamarsh, Suffolk, England; Dr. Arthur Rydon, N. Chailey, Sussex, England; Dr. Viette and Dr. Bernardi, Natural History Museum, Paris; Dr. Berger, Central African Museum, Tervuren, Belgium; Dr. Kasy, Vienna Museum, Austria; Monsieur J. Plantrou, of Paris; Dr. Fox, Carnegie Museum, Pittsburgh, U.S.A.; Dr. Hannemann, Natural History Museum, Berlin; Dr. E. Pinhey, National Museum, Bulawayo; the late Dr. G. van Son, Transvaal Museum, Pretoria, S. Africa; Mr. K. M. Pennington Balgowan, Natal; Mr. D. C. Plowes, Umtali, Rhodesia; Dr. C. B. Cottrell, Salisbury, Rhodesia; Mr. H. D. Handman, Zomba, Malawi; Mrs. Joan Wedekind, Mumbwa, Zambia; Mr. B. Barton-Eckett, Bathurst, Cape Prov., S. Africa; Dr. C. H. McCleery, Lindi, Tanzania; Mr. J. H. Bailey, Menengai, Kenya; the late Mr. T. H. E. Jackson, Kitale, Kenya; Mr. R. H. Carcasson, National Museum, Nairobi, Kenya; and Mr. H. D. van Someren, Endebess, Kenya.

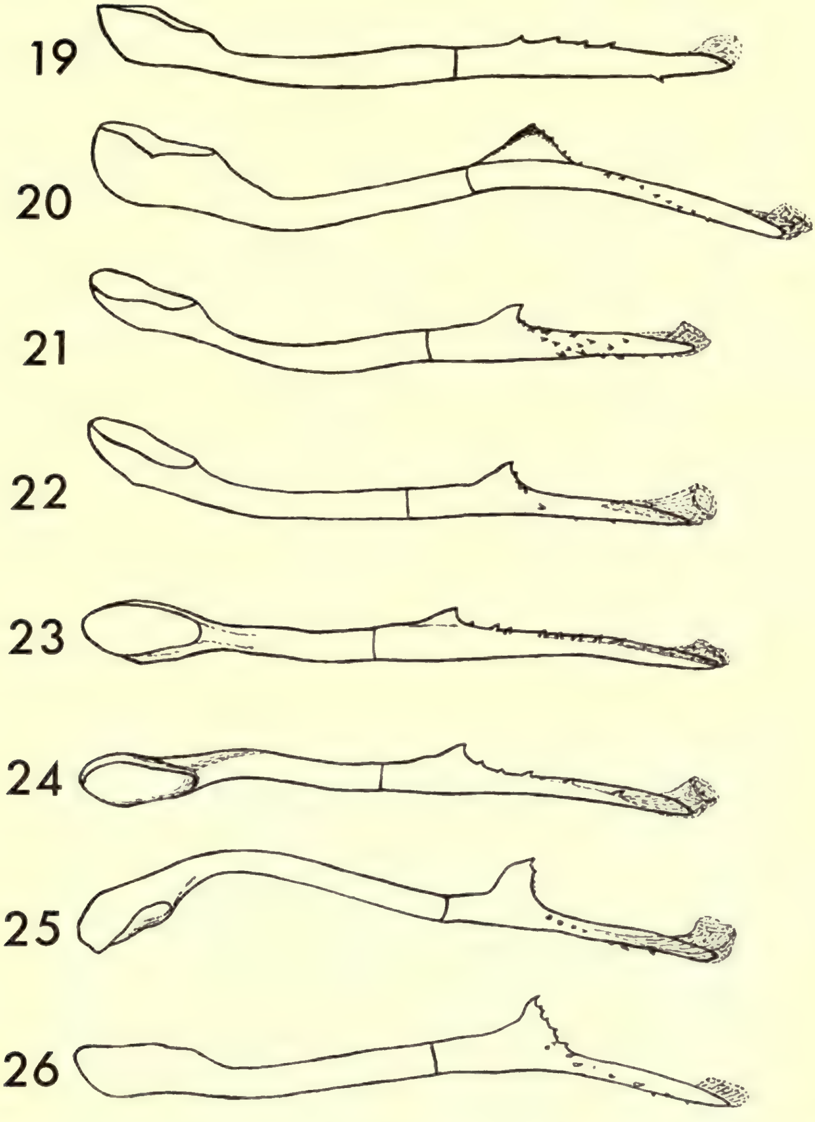
I desire also to record my thanks to the following for financial assistance toward the cost of photographic work connected with these revisions: Dr. Arthur Rydon, N. Chailey, Sussex, Major Iain Grahame, Lamarsh, Suffolk; and Mr. C. G. C. Dickson of Cape Town, S. Africa.



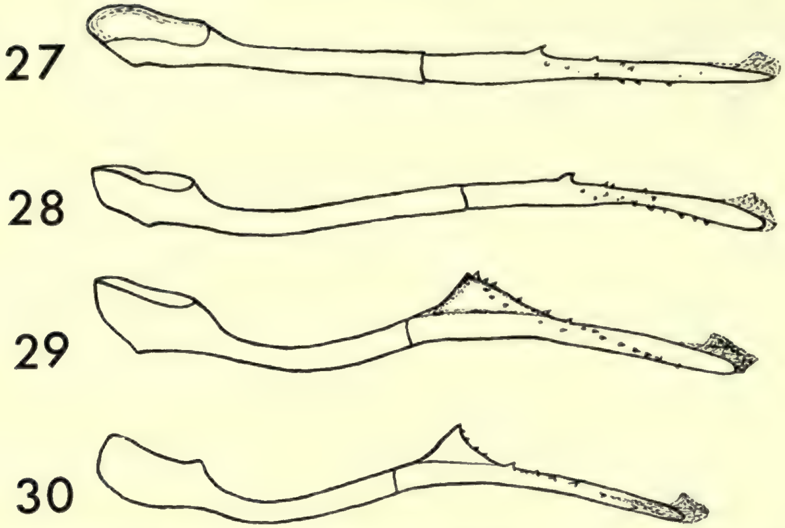
FIGS. 1–9. Aedeagi of *Charaxes* spp. 1, *etheocles etheocles* (Cramer), Nigeria (Prep. 64, A. H. B. Rydon); 2–4, *etheocles carpenteri* Poulton, ♂ f. *catachrous*, Katera, Uganda (Preps. 669, 670, T. G. Howarth; prep. 55, A. H. B. Rydon); 5–6, *etheocles evansi* van Someren, Kitale, east Mt. Elgon, Kenya (Preps. 61–62, A. H. B. Rydon); 7–8, *grahamei* van Someren, Kigoma Dist., N. E. Lake Tanganyika, Tanzania (Preps. 672, 671, T. G. Howarth); 9, *mafuga* van Someren, Mafuga Forest, Kigezi, Uganda (Prep. 10, A. H. B. Rydon). Del. A. H. B. Rydon.



FIGS. 10–18. Aedeagi of *Charaxes* spp. 10–11, *berkeleyi* van Someren & Jackson, Karen, Ngong, Kenya (Preps. 56–57, A. H. B. Rydon); 12, *aubyni aubyni* Poulton, Teita Hills, Kenya (Prep. 173, A. H. B. Rydon); 13–14, *baileyi* van Someren, Visoi Gap, west Rift Valley, Kenya (Preps. 51–52, A. H. B. Rydon); 15–16, *pembanus* Jordan, Pemba Island, N.E. of Zanzibar, East Coast (Prep. 170, A. H. B. Rydon), lateral and dorsal views; 17–18, *usambarae* van Someren & Jackson, Amani, lower forests, Usambara Mts., Tanzania (Prep. 169, A. H. B. Rydon), lateral and dorsal views. Del. A. H. B. Rydon.



Figs. 19–26. Aedeagi of *Charaxes* spp. 19, *karkloof* van Someren & Jackson, Mt. Karkloof, Natal, S. Africa (Prep. van Son); 20, *credreatis* Hewitson, ♂ *lutacea* Rothschild, Kisubia Forest, nr. Entebbe, Uganda (Prep. 175, A. H. B. Rydon); 21, *alpinus* van Someren & Jackson, Vumba Mts., Rhodesia (Prep. van Son); 22, *alpinus nyikensis* van Someren, Nyika Plateau, Malawi (Prep. van Son); 23, *ethalion littoralis* van Someren, Marere Forest, Shimba Hills, Kenya Coast (Prep. 176, A. H. B. Rydon); 24, *ethalion ethalion* Boisduval, Natal, South Africa (Prep. van Son); 25, *petersi* van Someren, Liberia & Ivory Coast (Prep. 50, A. H. B. Rydon); 26, *Charaxes* sp. nov.? Bunduki Hill, Uluguru Mts., Tanzania (Prep. 164, A. H. B. Rydon). Del. A. H. B. Rydon.



FIGS. 27–30. Aedeagi of *Charaxes* spp. 27–28, *contrarius* Weymer, Zombo Forest, Kwale Dist., Kenya Coast (Preps. 58–59, A. H. B. Rydon); 29, *viola kirki* Butler, Mackinnon Road, Coast belt, Kenya (Prep. 177, A. H. B. Rydon); 30, *manica* Trimen, Mpanda, Tanzania (Prep. 3, A. H. B. Rydon). Del. A. H. B. Rydon.

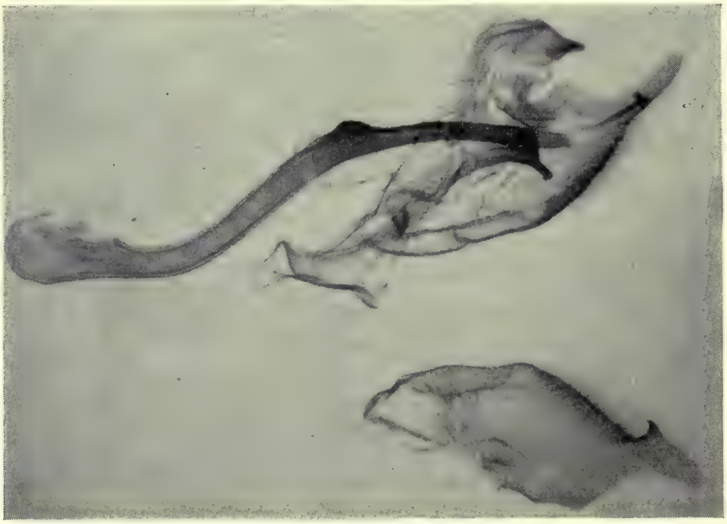


FIG. 31. *Charaxes kheili* Staudinger. Type ♂ genitalia. B.M. Neg. No. 8749.

## REFERENCES

References not given below will be found in Parts I-IV of this revision.

Butler, A. G. 1876. On a Collection of Lepidoptera recently received from Abyssinia. *Ann. Mag. nat. Hist.* (4) **18** : 480–490.

—— 1881. On a new species of *Charaxes* from W. Africa. *Entomologist's mon. Mag.* **18** : 107–108.

—— 1893. Description of a new species of the butterfly genus *Charaxes*. *Ann. Mag. nat. Hist.* (4) **12** : 266.

Feisthamel, M. 1850. Description de quelques Lépidoptères Rhopalocères nouveaux ou peu connus provenant de la Cazamance (Afrique). *Annls Soc. ent. Fr.* **1850** : 247–262.

Gründberg, K. 1911. *Wissenschaftliche Ergebnisse der Deutschen Zentral-Afrika Expedition* 1907–1908. **3** (17) : 506–560. 4 pls. Leipzig.

Hewitson, W. C. 1874. Description of a new species of *Charaxes* from the West Coast of Africa. *Entomologist's mon. Mag.* **10** : 247–248.

—— 1876. *Illustrations of new species of Exotic Butterflies.* **5** : 1–116, 60 pls. London.

—— 1877. Descriptions of three new species from Delagoa Bay. *Entomologist's mon. Mag.* **14** : 81–83.

Holland, W. J. 1896. List of the Lepidoptera collected in East Africa 1894, by Mr. William Astor Chamber and Lieutenant Ludwig von Höhnel. *Proc. U.S. natn. Mus.* **18** : 741–767.

Jackson, T. H. E. 1957. Notes on the Rhopalocera of the Kigezi District of Uganda with descriptions of new species and subspecies. *Jl E. Africa nat. Hist. Soc.* **23** : 63–78, 13 pls.

Le Moult, E. 1933. Formes nouvelles ou peu connus de *Charaxinae* (Lep. Nymph.). *Novit ent.* **2** : 16–18.

Rousseau-Decelle, G. 1934. De quelque formes nouvelles de *Charaxes* africaines. *Bull. Soc. ent. Fr.* **39** : 228–235, 1 pl.

Stoneham, H. F. 1964. *Butterflies of Western Kenya.* Pts. 8–9 : 109.

Talbot, G. 1928. New forms of African Nymphalidae (Lep. Rhop.) in the Musée du Congo, Tervuren. *Bull. Hill. Mus. Witley* **2** : 229–231.

Trimen, R. & Bowker, J. H. 1887. *South African Butterflies* **1** : 348. London.

van Someren, V. G. L. 1958. A new species and a new female form of "*Charaxes*" from Kenya Colony. *Novos Taxa ent.* **11** : 1–12, 2 pls.

—— 1963. Revisional Notes on African *Charaxes* (Lepidoptera : Nymphalidae). Part I. *Bull. Br. Mus. nat. Hist.* (Ent.) **13** (7) : 195–242, 19 pls., 5 text-figs.

—— 1964. Part II. *Bull. Br. Mus. nat. Hist.* (Ent.) **15** (7) : 181–235, 23 pls., 4 maps.

—— 1966. Part III. *Bull. Br. Mus. nat. Hist.* (Ent.) **18** (3) : 45–100, 16 pls., 5 maps.

—— 1966*a*. Part IV. *Bull. Br. Mus. nat. Hist.* (Ent.) **18** (9) : 277–316, 9 pls., 4 maps.

van Son, G. 1966. A new subspecies of *Charaxes viola* Butler from South-West Africa. *Novos Taxa ent.* **49** : 3–7.

Westwood, J. O. 1874. *Thesaurus entomologicus Oxoniensis*, pp. 1–205, 40 pls. Oxford.

## INDEX

New taxonomic names in **bold** type

achaemenesopsis, ♀ f., 132
acuminatus, 77
albifascia ♀ f., 131, 133
albimacula ♀ f., 143
albocaerulea ♀ f., 143
alladinis ♀ f., 100, 105
angusticlavius ♀ f., 151
aurantiaca ♂ ♀ ff., 157

baileyi, 122
**basiviridis** ♀ f., 145
berkeleyi, 80
**biinclinata,** 102
brainei, 147

**caerulescens** ♀ f., 80, 143
cameroonensis, 151
carpenteri, 108, 109
carteri ♂ f., 102
catachrous ♂ f., 102, 106, 111
cedreatis, 84, 85
chanleri, 133

**chepalungu,** 90
**conjugens** ♀ f., 121
conjuncta ♀ f., 113
contrarius, 119, 120
coryndoni ♀ f., 137
**cottrelli** ♀ f., 140
cupreopurpurea ♀ f., 144
cynthia, 149, 150

daria, 134
dewitzi ♀ f., 90
diversiforma, 141, ♀ f., 143
druceanus, 78

ephyra ♂ f., 101
etheocles, 99
evansi, 112

fulgens ♀ f., 101

**grahamei,** 115

handari ♀ f., 131
hollandi ♂ f., 101

**inexpectata** ♀ f., 88
**instabilis** ♀ f., 146
intermedia ♀ f., 133

kheili, 94
**kilimensis** 82
kinduanə, 153
kirki, 130
kirkoides ♀ f., 132

**lacteata** ♀ f., 117
**loandae,** 144, ♀ f., 145

**mafuga,** 97
**masaba,** 82
mukuyu, 158

**ngonga** ♀ f., 80
northcotti, 96

**obudoensis,** 77
occidens, 79
ochracea, 106
ochremaculata ♀ f., 143

pallidimacula ♀ f., 110
parvicaudatus, 154
penricei, 80
**petersi,** 121
phaeus, 136, ♀ f., 137, 138
picta, 128
**primitiva** ♀ f., 144
propinqua, 155
protocedreatis ♀ f., 87
**protokirki** ♀ f., 145
pseudocarpenteri ♀ f., 124
pseudosmaragdalis ♀ f., 89
purpurea ♀ f., 141
pythodoris, 79

regalis ♀ f., 101, 104
rogersi ♀ f., 131
**rosella** ♀ f., 140

sabulosus, 156
schoutedeni, 79
seriata ♀ f., 107
suk, 132
tanganyikae, 80
tectonis, 78
**tricolor** ♀ f., 140
tincta ♀ f., 145

vansomereni ♀ f., 129
vansoni ♀ f., 137
**vansonoides** ♀ f., 145
**variata,** 138, ♀ f., 139
vetula ♀ f., 88
viola, 125, 127
**violitincta** ♀ f., 145
viridicaerulea ♀ f., 141
virilis, 92

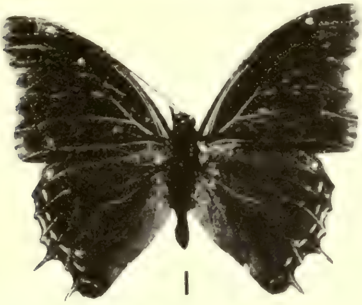
xiphares, 82

## PLATE 1

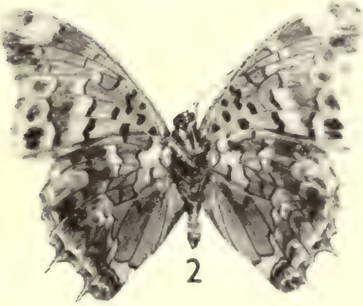
### *Charaxes cedreatis* Hewitson

| | |
|---|---|
| FIGS. 1 & 2. | ♂ = *lutacea* Rothschild Type. (N.E. Congo: Beni. [B.M. (N.H.)], upper and underside. Photos B.M. (N.H.) Nos. 39912; 39913. |
| FIGS. 3 & 4. | ♀ Type. (Fernando Po.) [B.M. (N.H.)], upper and underside. Photos B.M. (N.H.) Nos. 39918; 39919. |
| FIG. 5. | ♂ with strongly developed subcostal spots to fore wings and large glaucous lunules on margins; base of fore wing strongly greenish; hind wing with postdiscal wavy green line. Underside pattern not strong and suffused brownish. (Tanzania [Tanganyika], Geita), upper and underside. |
| FIG. 6. | ♂ boldly marked on upperside; hind wing with strong greenish postdiscal line; underside pattern strong and colder greyish ground colour with satiny bars strong. (N. Angola, Amboim), upper and underside. |
| FIGS. 7 & 8. | ♀ form *inexpectata* forma n. (Ivory Coast: Abidjan) (*Gallay*). N.B. The black area at the base of the wings ♀ fig. 7 is a stain and should be ignored, upper and undersides. |

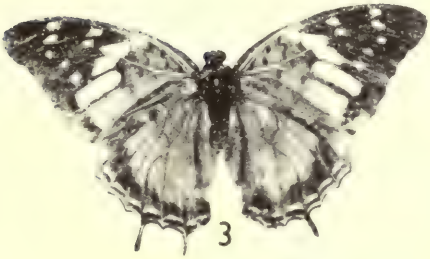
Approx. 2/3 nat. size.



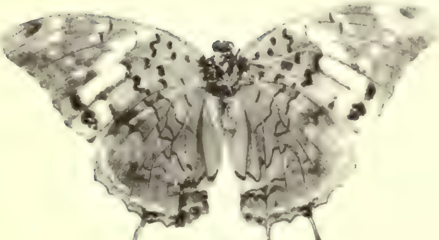
1



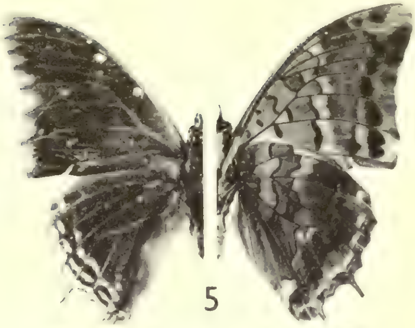
2



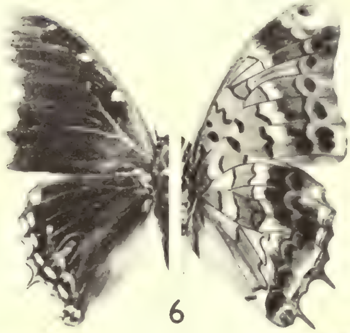
3



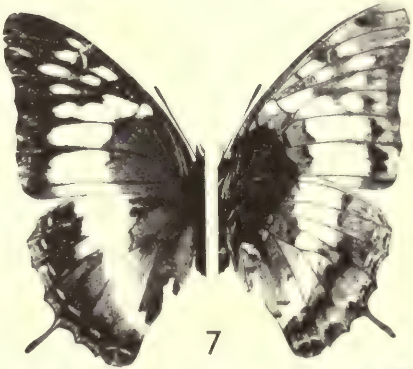
4



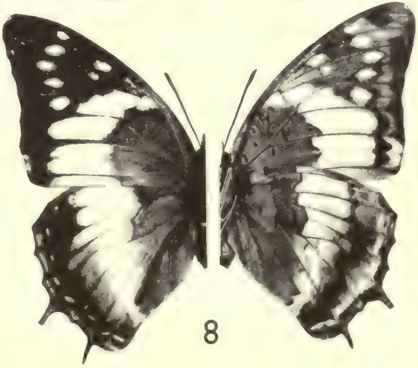
5



6



7



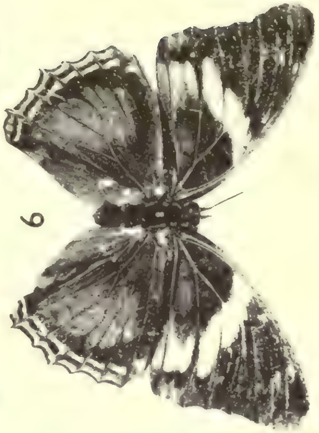
8

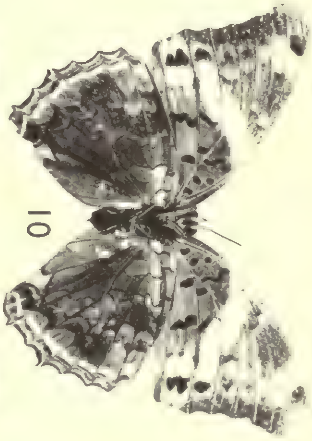
## PLATE 2

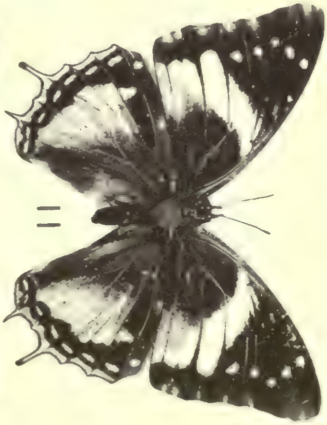
*Charaxes cedreatis* Hewitson

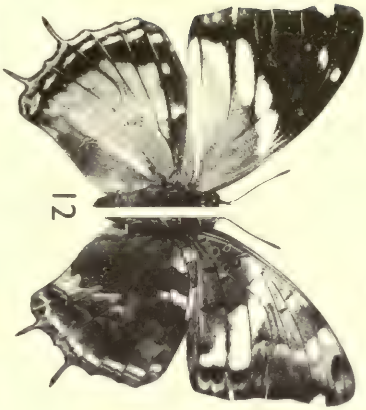
| | |
|---|---|
| FIGS. 9 & 10. | ♀ form *vetula* Rothschild. Type. [Gabon: Ogowe river. B.M. (N.H.)]. Upper and underside Photos B.M. (N.H.) Nos. 39916; 39917. |
| FIG. 11. | ♀ form *vetula* Rothschild. (Kakamega forest) flying with ♀ form *cedreatis* and ♂ *lutacea* (Rydon coll.). |
| FIG. 12. | ♀ form *cedreatis* Hewitson. (Uganda: Jinja.) Upper & underside. |
| FIGS. 13 & 14. | ♀ form *inexpectata*, forma **n.** Type. [Tanzania (Tanganyika): Kigoma Dist., Mukuyu Forest.] Upper and underside. (Grahame coll. Deposited in B.M. (N.H.)). |
| FIG. 15. | ♀ form *protocedreatis* Poulton [Tanzania (Tanganyika): Serengetti Game Park, riverine forest on Orange River.] Similar specimens occur in Eastern Uganda at Jinja. Upper and underside. |
| FIGS. 16 & 17. | ♀ form *cedreatis* (fig. 16) and ♀ form *vetula* Rothschild (fig. 17). Taken in same trap, (Kenya: Visoi Gap, between Kilombe Hill and Londiani Hill, west side of Rift Valley). Upper and underside. |

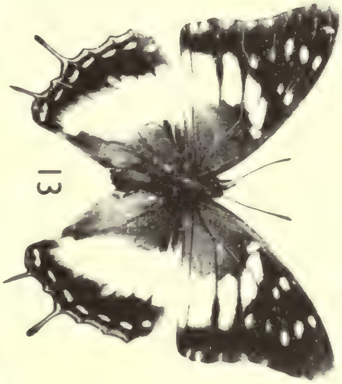
Approx. 2/3 nat. size.

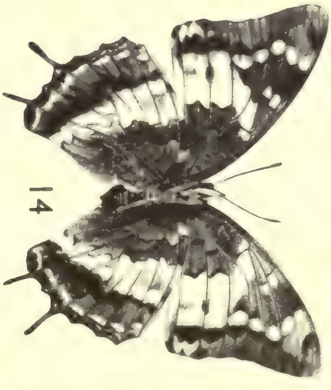

9

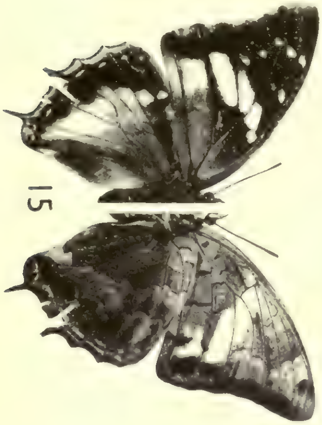

10

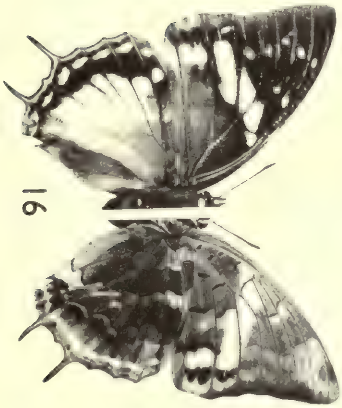

11

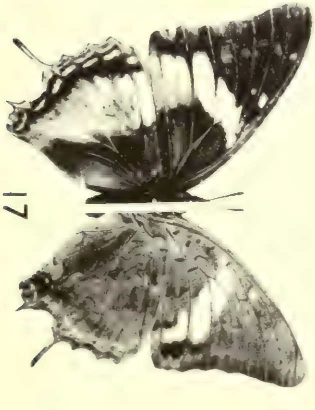

12


13


14


15


16


17

## PLATE 3

*Charaxes*

Figs. 18 & 19. *cedreatis* Hewitson, ♀ form *pseudosmaragdalis* van Someren & Jackson, Type. (Central African Museum, Tervuren, Belgium.) Upper and underside. All light markings blue with the exception of large subapical spots fore wing and submarginal linear marks in hind wing which are white.

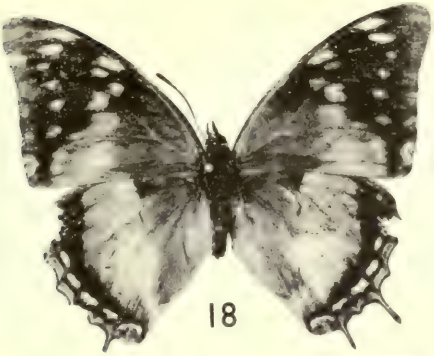
Fig. 20. *cedreatis* Hewitson ♀ form *dewitzi* Butler. Photograph of original colour figure, Type lost. Pattern generally similar to *pseudosmaragdalis* but lacking the postdiscal row of blue spots in fore wing, upper and underside.

Fig. 21. *chepalungu* sp. n. Gynandromorph. (Kenya: Chepalungu Forest.) (National Museum, Nairobi) (*R. T. Evans* leg.).

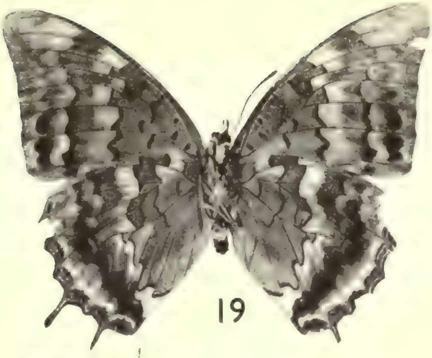
Figs. 22 & 23. *chepalungu*, upper and underside. ♀ Type. (Kenya: Chepalungu Forest, lower Sotik.)

Figs. 24 & 25. *chepalungu*, upper and underside. ♂ Type. (Kenya: Chepalungu Forest).

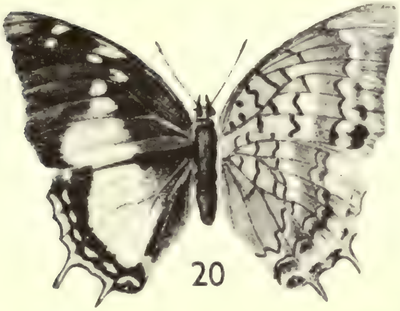
Approx. 2/3 nat. size.



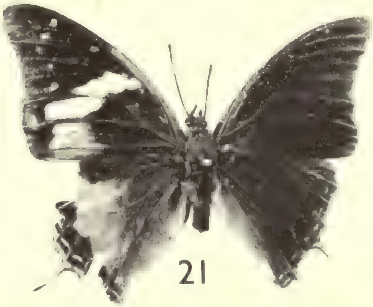
18



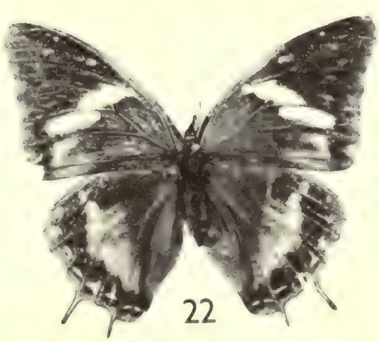
19



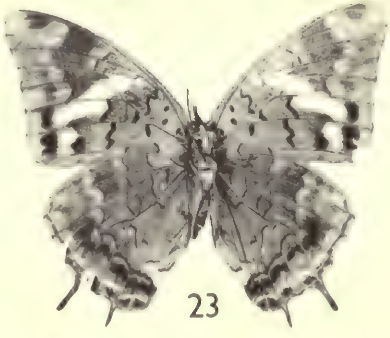
20



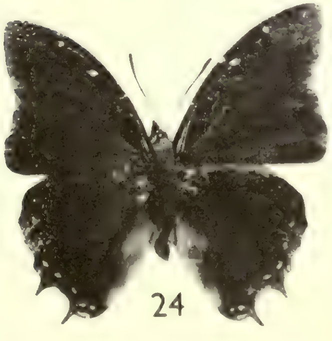
21



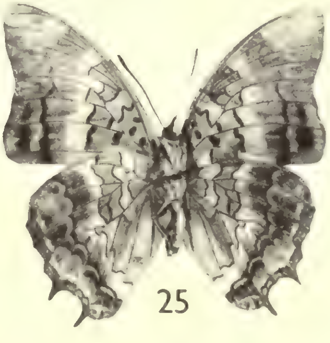
22



23



24



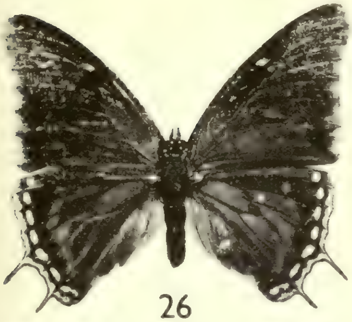
25

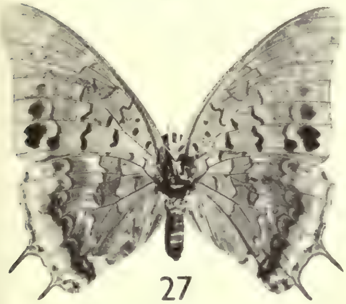
## PLATE 4

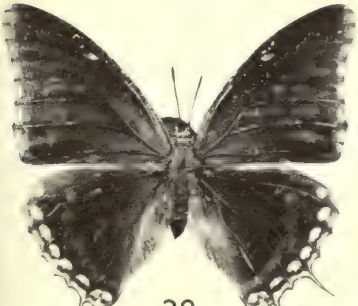
### *Charaxes virilis* Van Someren & Jackson

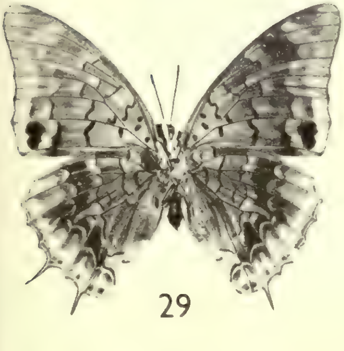
| | |
|---|---|
| FIGS. 26 & 27. | Type of *virilis* van Someren & Jackson (W. Africa), upper and underside. Photos B.M. (N.H.) Nos. 34024; 34025. |
| FIGS. 28 & 29. | ♀ (Uganda: Busia-Tororo Forest) (*Bailey*). Ground colour very similar to figs. 26 & 27 but with stronger blue sheen; fore wing marginal lunules more defined. Hind wing with postdiscal row of greenish blue spots more distinct; submarginal white spots larger; margin reddish ochre to lower tail. Borders of wings on underside satiny with a strong rusty tinge to the postdiscal zone of both wings; the submarginal row of whitish marks strong, upper and underunderside. |
| FIG. 30. | ♂ (Uganda: Forests of Busiu-Tororo and Mabira Forest, Busoga), upper and underside. |
| FIG. 31. | ♀ (Moyen Congo: Kelle) (*Jackson*). Ground colour strong blue, marginal glaucous marks diffuse. Blue spot beyond cell in fore wing distinct, but with other spots very faintly indicated. Hind wing greenish, postdiscal line stronger. Underside ground colour dark vinaceous brown, paler on borders and satiny bars more distinct, upper and underside. |
| FIG. 32. | ♂ (S. Nigeria: Ibadan), (Oxford). Ground colour blue-black with strong blue sheen. Blue marks on fore and hind wings smaller, suffused purplish. Under side rusty greyish brown, border on fore wing lighter. Pattern not strong, upper and underside. |
| FIG. 33. | ♀ (Cameroon: Bitje), [B.M.(N.H.)]. An aberrant specimen with a large greenish blue triangular mark beyond end of cell in fore wing. Underside vinaceous brown, pattern faint, but satiny bars present particularly in disc of hind wing, upper and underside. |
| FIGS. 34 & 35. | Type ♂ form *virilis* Rothschild. (Uganda: Jinja.) 34, upperside, purplish blue-black. Fore wing with obscure blue subcostal marks beyond end of cell; obscure glaucous marks on margin. Hind wing with faint trace of greenish postdiscal line; submarginal white spots distinct; some reddish on margin above upper tail. 35, underside, dark vinaceous brown; faint satiny bars through discs of wings; pattern faint. |
| FIGS. 36 & 37. | form *lenis* Jordan. ♂ Type. (Uganda: Budongo Forest.) 36, upperside as in fig. 34. Fore wing with additional blue mark at upper part of end of cell. No greenish postdiscal line on hind wing; marginal red to lower tail. 37, underside: ground colour similar to fig. 35 but satiny bars and pattern stronger. |

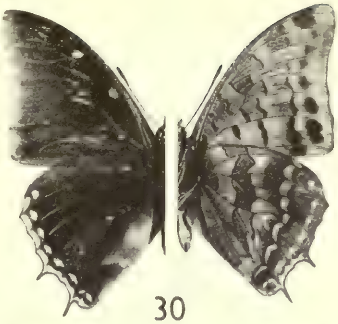
Approx. 3/4 nat. size.

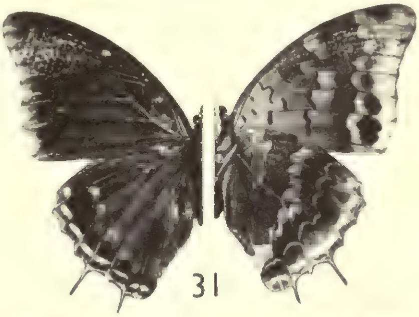

26

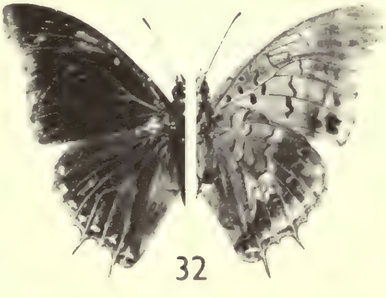

27

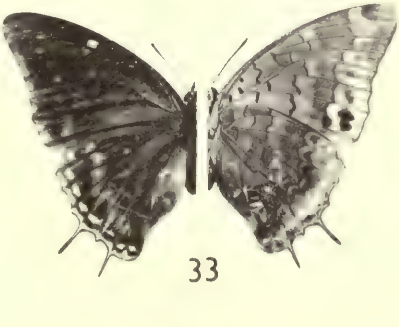

28

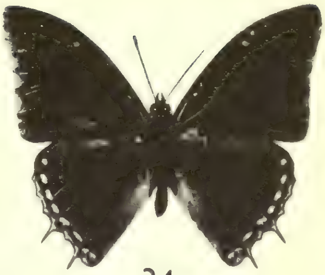

29

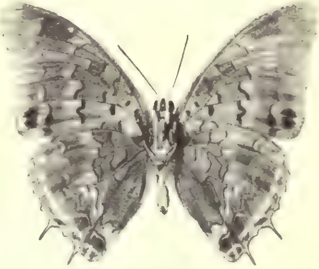

30

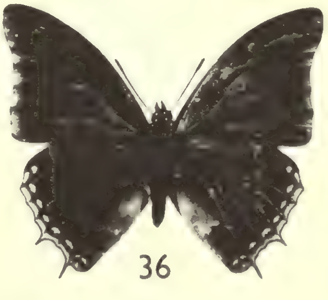

31

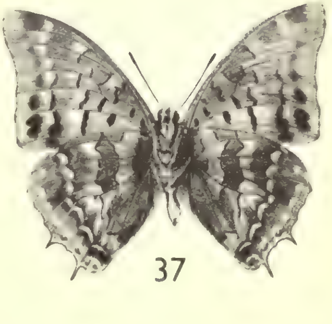

32


33


34


35


36


37

## PLATE 5

### *Charaxes*

FIGS. 38 & 39. *kheili* Staudinger. ♂ Type (Njam–Njam) upper and underside. Photos B.M. (N.H.) Nos. 8747; 8748.

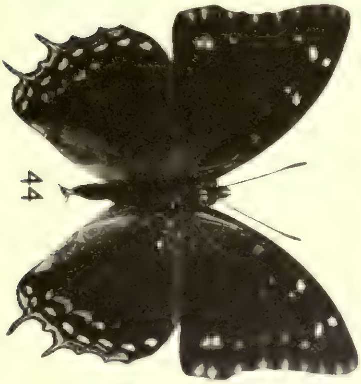
FIGS. 40 & 43. *kheili* ? ssp., Metu, (Uganda: Madi, W. Nile.) Upper and underside.

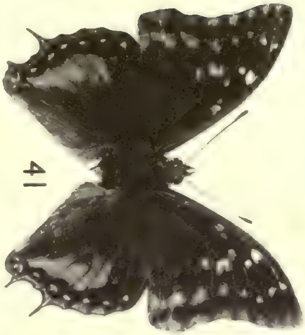
FIGS. 41 & 42. *northcotti* Rothschild, ♂ Type in B.M. (N.H.). Upper and underside. Photos B.M. (N.H.) Nos. 38817; 38818.

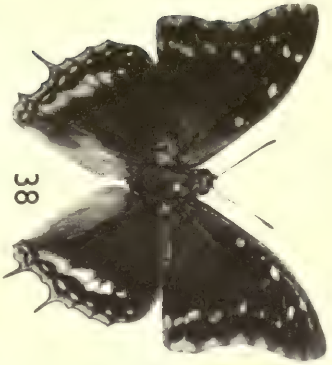
FIGS. 44 & 45. *mafuga* sp. n. ♂ Type. (Uganda: Rutenga–Mafuga Forest, Kigezi) upper and underside.

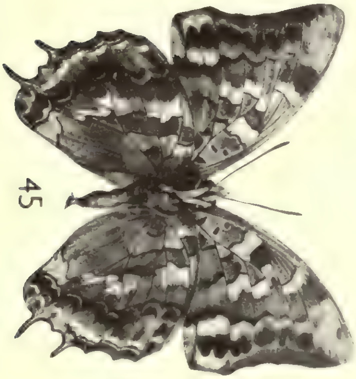
FIG. 46. *kheili-northcotti* var. (Central African Republic: Bouar), upper and underside.

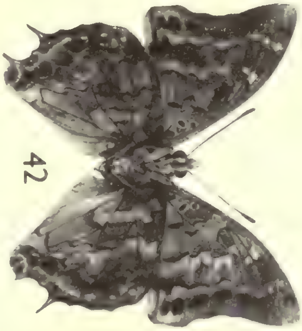
Approx. 2/3 nat. size.

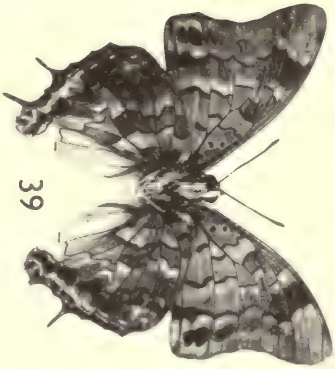

44

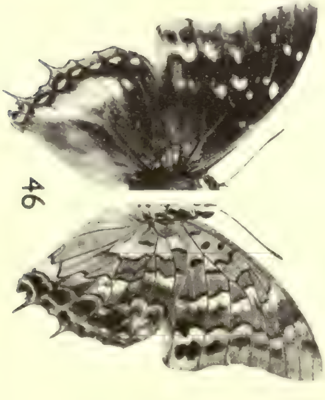

41

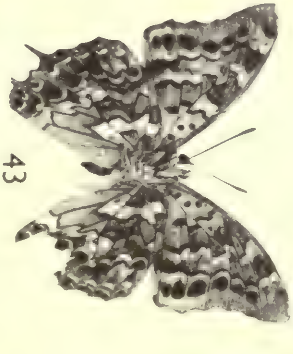

38

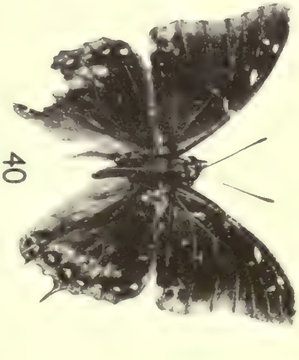

45


42


39


46


43

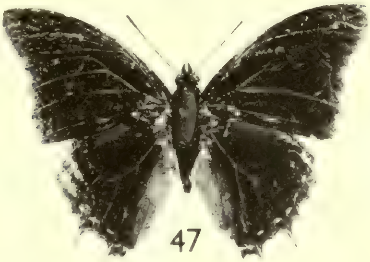

40

## PLATE 6

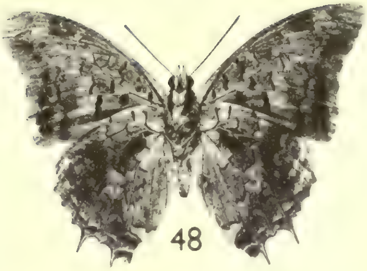
### *Charaxes etheocles etheocles* Cramer

| | |
|---|---|
| FIGS. 47 & 48. | ♂ form *carteri* Butler, 1881, Type. (Ghana [Gold Coast], Accra), upper and underside. Photos B.M. (N.H.) Nos. 41808; 41809. |
| FIGS. 49 & 50. | ♂ form *hollandi* Butler, 1893, Type. (Sierra Leone), upper and underside. Photos B.M. (N.H.) Nos. 41807; 41810. |
| FIGS. 51 & 52. | ♀ form *regalis* Rothschild, Type. (Sierra Leone), upper and underside. Photos B.M. (N.H.) Nos., 34026; 34027. |
| FIGS. 53 & 54. | ♀ form *fulgens* Rothschild, Type. (Sierra Leone), upper and underside. Photos B.M. (N.H.) Nos. 34032; 34023. |

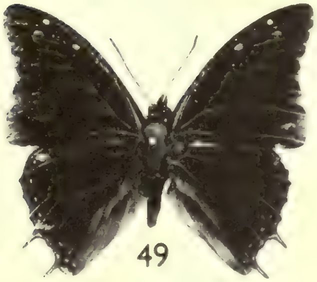
Approx. 2/3 nat. size.



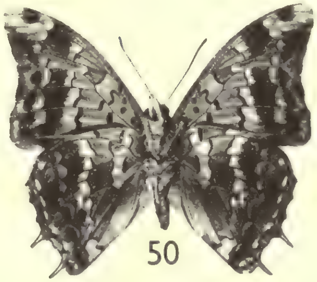
47



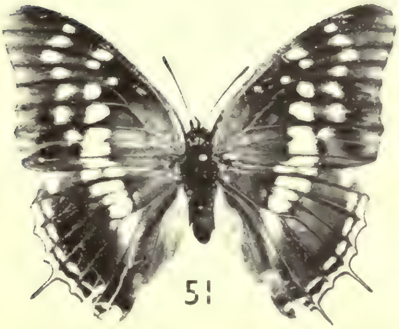
48



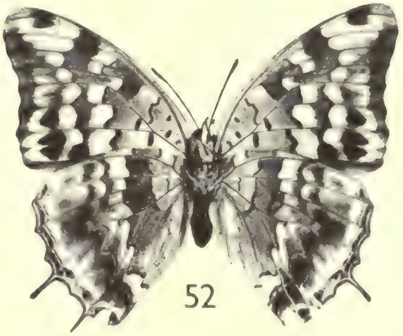
49



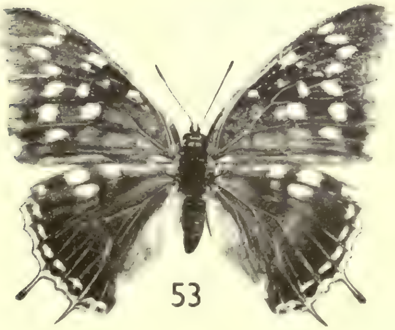
50



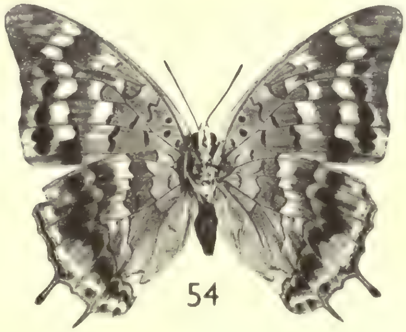
51



52



53



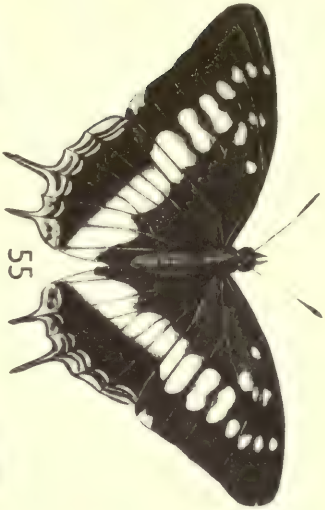
54

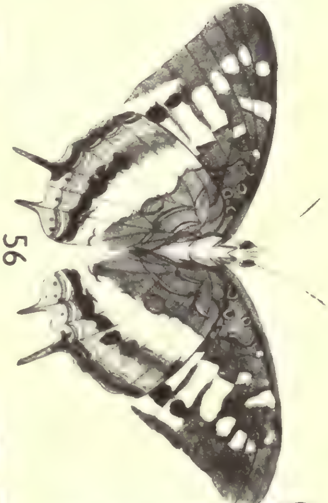
## PLATE 7

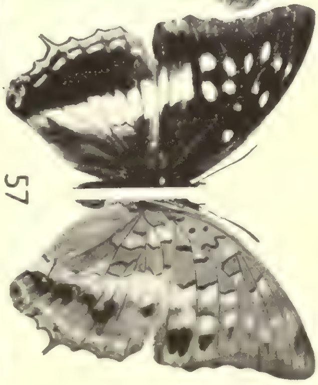
*Charaxes etheocles etheocles* (Cramer)

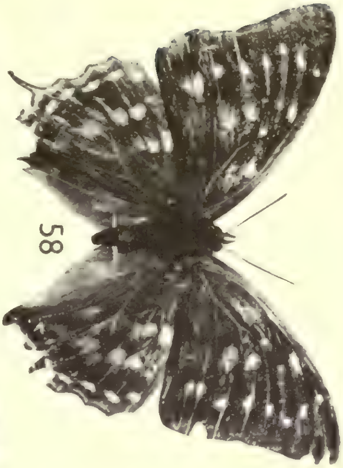
| | |
|---|---|
| FIGS. 55 & 56. | ♀, Photograph of the original figure in *Pap. Exot.* Part **2**, Pl. CXIX. (Sierra Leone), upper and underside. Photos B.M. (N.H.). Nos. 40800, 40801. |
| FIG. 57. | ♀ form *etheocles* (Cramer), topotypical. (Sierra Leone). Fore wing spots well separated, mostly white, slightly ochre tinged in postdiscal row. Hind wing band narrow, slightly blue tinged on inner border. Underside pattern moderately strong, upper and underside. |
| FIGS. 58 & 59. | ♀ form *alladinis* Butler var. (Cameroons), upper and underside. |
| FIG. 60. | ♀ form *etheocles* (Cramer), topotypical. (Sierra Leone). Fore wing spots slightly conjoined; hind wing band wider than in figs. 58 and 59. Underside pattern very similar to fig. 59, but fore wing spots " rayed ", upper and underside. |
| FIGS. 61 & 62. | ♀ form *alladinis* Butler. (Sierra Leone), upper and underside. |
| FIG. 63. | ♀ form *etheocles* (Cramer), topotypical. (" West Coast "). Fore wing spots white, more strongly " rayed " than fig. 60. Hind wing band wider, white. Underside pattern and raying strong, upper and underside. |

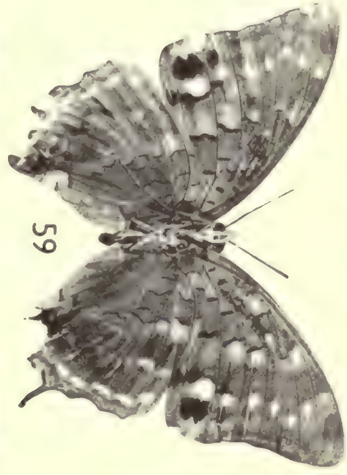
Approx. 2/3 nat. size.

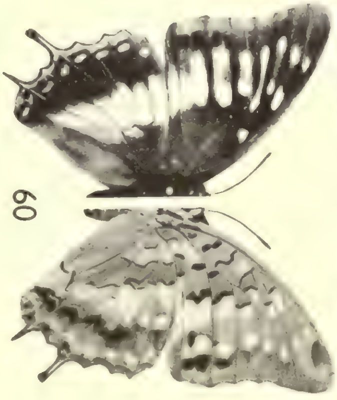

55

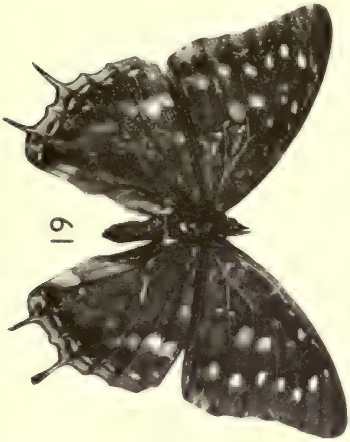

56

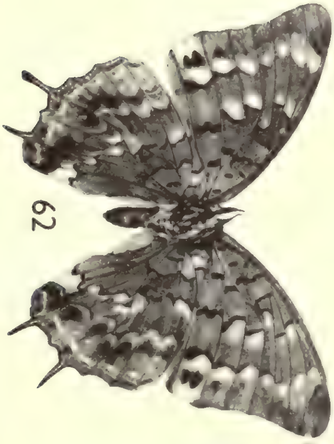

57

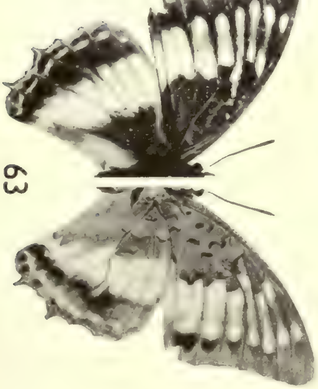

58


59


60


61


62

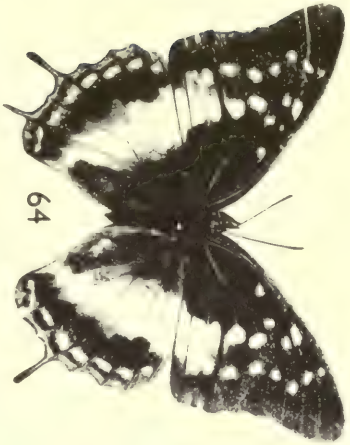

63

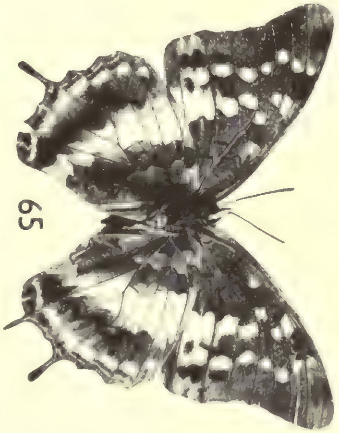
## PLATE 8

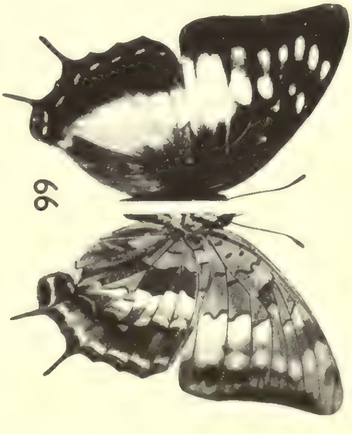
### *Charaxes etheocles carpenteri* Poulton

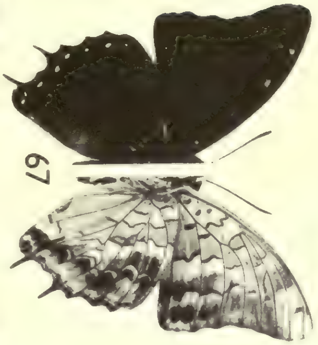
| | |
|---|---|
| FIGS. 64 & 65. | ♀ form *pallidimacula* van Someren & Jackson. Type. (Uganda: Jinja). Fore wing spots white, widely separated, but spots in 1b fused. Hind wing band broad, white, with blue border distally opposite tail region. Marginal spots bold. Underside ground colour darker, more brownish, upper and underside. |
| FIG. 66. | ♀ (Kenya: South Kavirondo, Suna). Ground colour blue-black. Fore wing discal and post discal spots slightly " rayed "; postdiscal row ochreous, discal row slightly paler in upper half, but conjoined spots in 1a–1b bluish on proximal ends. Hind wing band wide, white with bluish borders. Submarginal linear marks not strong, underside boldly marked, upper and underside. |
| FIG. 67. | ♂ form *catochrous* Staud. (Uganda: Budongo Forest). Upperside deep blue-black; fore wing with small blue subcostal spots and indication of marginal dots. Underside ground colour brownish grey with satiny silvery bars well marked, upper and underside. |
| FIG. 68. | ♂ form *catochrous* Staud. (Western Uganda: Bwamba Valley). Upperside ground colour similar to fig. 67. Fore wing without blue dots but marginal spots distinct. Underside: basal two thirds both wings silvery grey with black markings strong, upper and underside. |
| FIG. 69. | ♂ (Uganda: Masaka, Katera Forest). Upperside ground colour blue-black; fore wing subcostal blue dots small; marginal internervular glaucous dots present. Underside ground colour darker brownish grey; satiny bars only slightly evident, upper and underside. |
| FIG. 70. | ♂ (Uganda: Jinja). Upperside ground colour blue-black; two minute subapical blue dots, but marginal glaucous lunules strong. Underside pattern not strong on a brownish grey ground; satiny bars not strong, upper and underside. |
| FIG. 71. | ♀ (Uganda: Masaka, Katera Forest). Fore wing spots well spaced, creamy, slightly more ochreous in postdiscal series. Hind wing band moderately wide but tapering, strongly bluish especially on distal border. Bred with ♀ form *carpenteri* in same family, upper and underside. |
| FIG. 72. | ♀ (Uganda: Toro area, Kibali Forest). Fore wing with large cell spot; discal spots large and white, that in 1b diffuse and blue. Postdiscal spots complete but small, blue. Hind wing, postdiscal spots incomplete, obscured except for one white spot in 7; a bluish costal spot present in discal line. Underside darker greyish brown ground colour with a more decided pattern on both wings, upper and underside. |

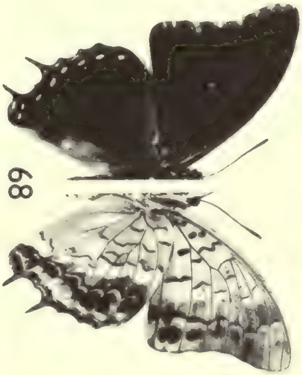
Approx. 2/3 nat. size.

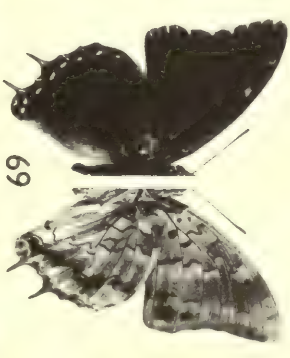

64

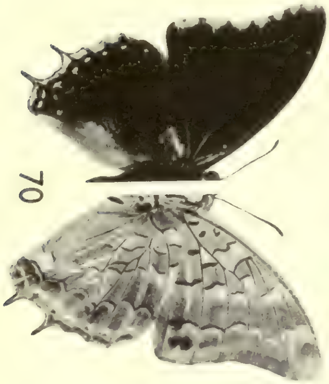

65

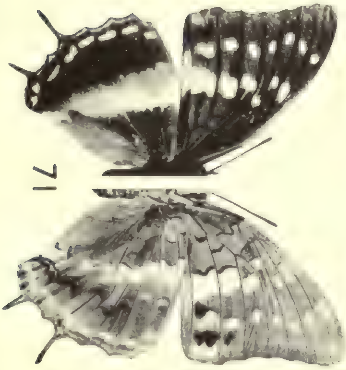

66

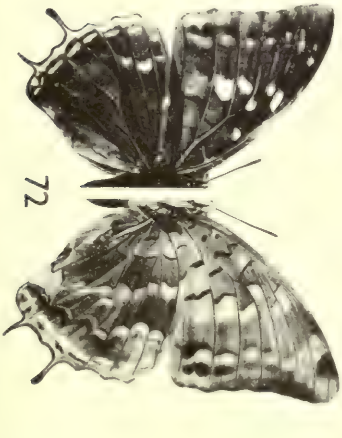

67


68


69


70


71


72

## PLATE 9

### *Charaxes etheocles* (Cramer)

FIG. 73. *carpenteri* Poulton ♀. (Tanganyika, S. E. Lake Victoria, Orange River, Serengeti Game Park, viii.1963). This specimen is very similar to the type, which came from Kakindu Hill, south of the Kagera river, west side of Lake Victoria, Tanganyika. Fore wing postdiscal spots complete, bluish; discal spots limited to 2–3, and a minute dot at subcosta. Hind wing postdiscal spots obscured except for bluish white marks in upper part. Underside greyish brown, pattern weak, except for tornal black marks. Upperside and underside.

FIG. 74. *carpenteri* Poulton ♀. (Uganda: Jinja, i.1922). Fore wing blue marks in discal and postdiscal zones large but diffuse. Hind wing postdiscal zone with large continuous greenish blue marks. Underside as in fig. 73. Upper and underside.

FIG. 75. *carpenteri* Poulton ♀. (Uganda: Masaka, Katera Forest, 1952). Bred in same family as ♀ *pallidimacula*. Fore wing postdiscal spots complete, bluish white, slightly bluer in 1a–1b. Discal spots bluish, deeper blue in 1b. Hind wing: Postdiscal spots (blue) complete; a trace of bluish marks in upper discal line. Underside: ground colour greyish brown with rusty flush over hind wing; pattern on fore wing moderate, upper and underside.

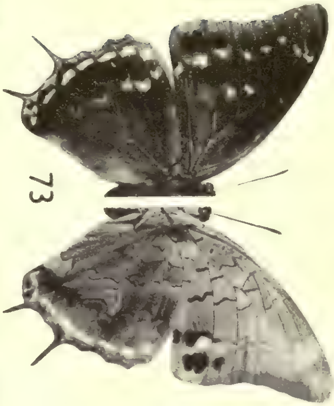
FIGS. 76 & 77. *evansi* van Someren & Rogers ♀ Type. (Kenya: East Elgon, 1932). Upper and underside. Photos B.M. (N.H.) Nos. 42563, 42564.

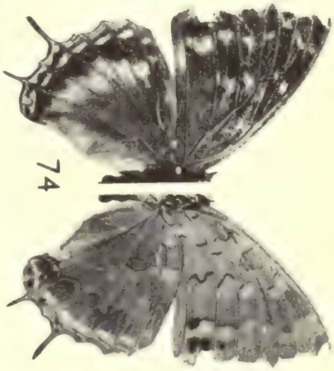
FIG. 78. *evansi* f. *conjuncta* ♀ van Someren & Jackson. (Kenya: Elgon, Kitale.) Fore wing spots orange-ochreous conjoined by rufous rays; margin of wing rufous. Hind wing band white with slight bluish on borders. Underside rusty brown with subdued pattern but bars well marked and slightly browntinged, upper and underside.

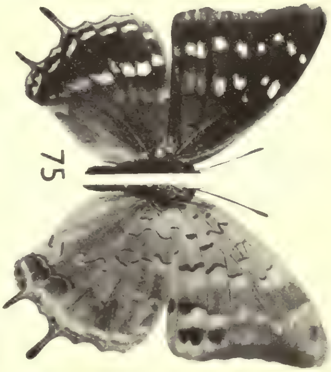
FIGS. 79 & 80. *evansi* van Someren & Rogers ♂. (Kenya: Elgon, Kitale). Upperside: ground colour deep blue-black; fore wing with distinct subcostal blue spots, and obscured marginal glaucous lunules distinct at hind angle. Underside ground colour greyish drab-brown slightly darker on borders; satiny bars on fore wing and hind wing fairly strong, upper and underside.

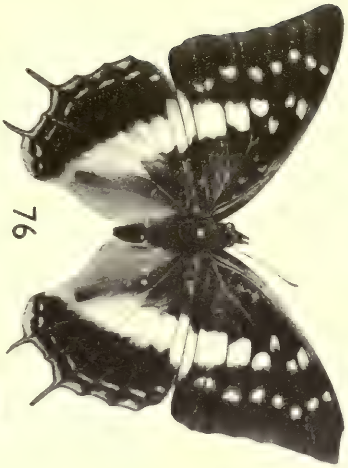
FIG. 81. *evansi* van Someren & Rogers ♀. (Kenya: Elgon, Kitale.) Fore wing spots orange-ochreous, well separated. Hind wing band white with slight blue on borders. Underside ground colour greyish brown, darker on borders of fore wing; satiny bars and pattern strong, upper and underside.

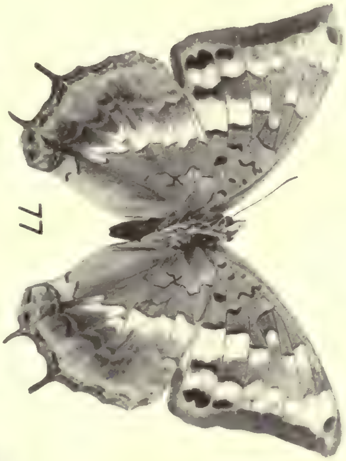
Approx. 2/3 nat. size.

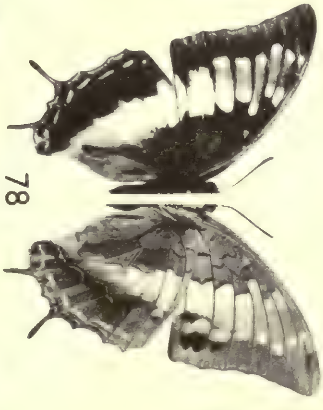

73

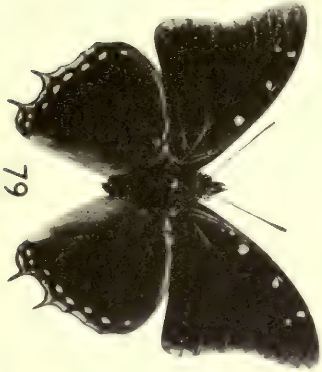

74

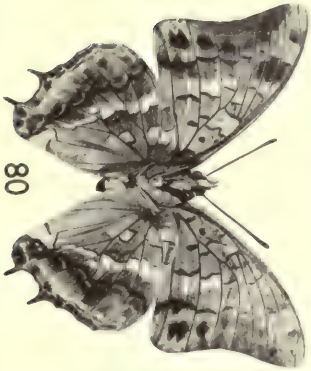

75

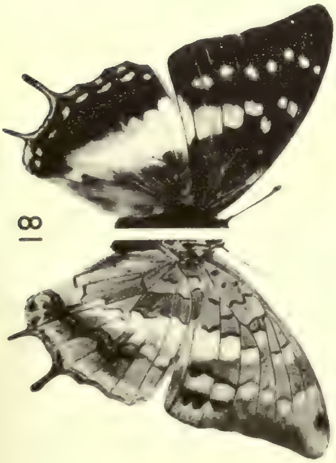

76


77


78


79


80

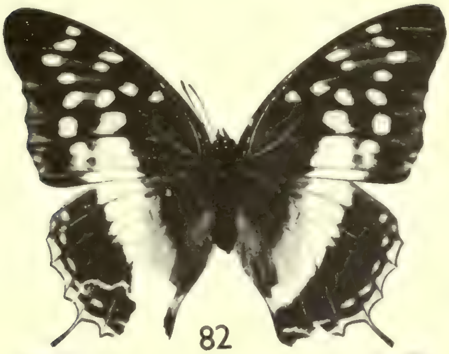

81

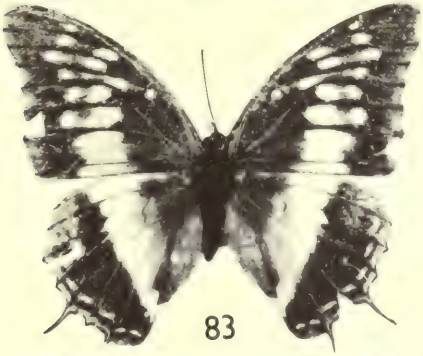
## PLATE 10

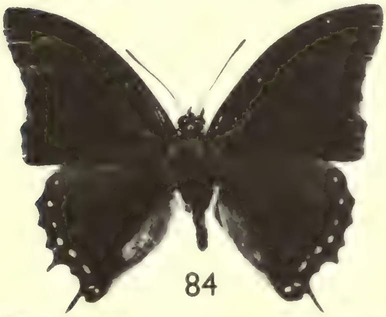
### *Charaxes etheocles* (Cramer)

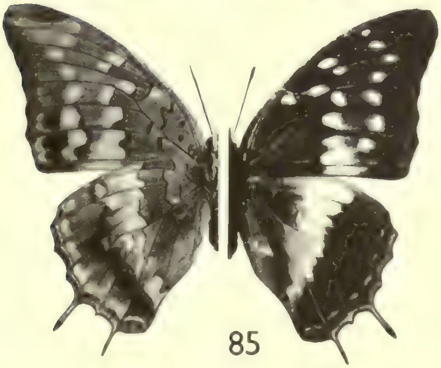
| | |
|---|---|
| Figs. 82 & 86. | *biinclinata* ssp. n. Holotype ♀. (Moyen Congo: Kelle, x. 1962) (*Jackson*). Fore wing spots bold, all creamy in colour. Hind wing band generally broad, white with blue or inner border. Underside greyish, darker on borders; pattern bold, upper and underside. |
| Figs. 83 & 87. | *biinclinata* ssp. n. ♀. var. (b). (S.E. Nigeria: Ikom, iii. 1958) (*Jackson*). Very similar to figs. 82 & 83 but fore spots conjoined by rays; margin with obscure lunules. Hind wing broader. Underside ground colour as in figs. 82 & 83. Fore wing spots rayed, upper and underside. |
| Figs. 84 & 88. | *ochracea* ♂ form *violacea* Rothschild (Gabon: Lambarene). Upperside: deep blue-black: fore wing immaculate; hind wing with small sub-marginal spots (white). Underside ground colour grey-brown, darker on postdiscal zone. Pattern strong, upper and underside. |
| Fig. 85. | *biinclinata* ssp. n. ♀. var. (a). (French Eq. Africa: Mambili, Ouesso, i.1962) (*Jackson*). Fore wing spots well separated, slightly ochreous, whiter in 1a–1b. Hind wing band tapering, white, with blue borders. Underside dark greyish brown; pattern strong, upper and underside. |
| Fig. 89. | *biinclinata* ssp. n. ♀. var. (c). (Mambili, Ouesso, i.1960) (*Jackson*). Fore wing spots all orange-ochreous except for large marks in 1a–1b whitish. Hind wing band narrow, creamy, with purple shade on borders. Ground colour of both wings above brownish black with purplish tone. Margin with obscure lunules. Underside darker brownish, pattern bold. Cf. *ochracea*. Upper and underside. |

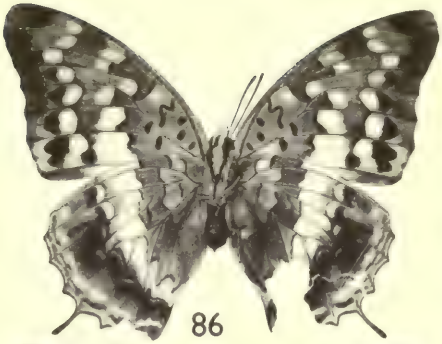
Approx. 2/3 nat. size.

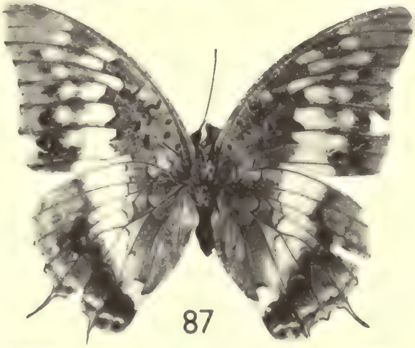

82

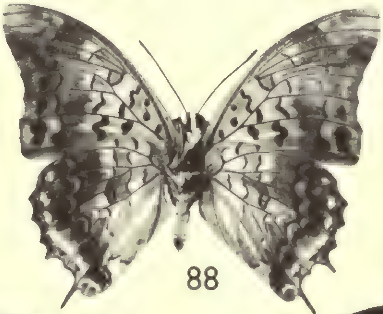

83

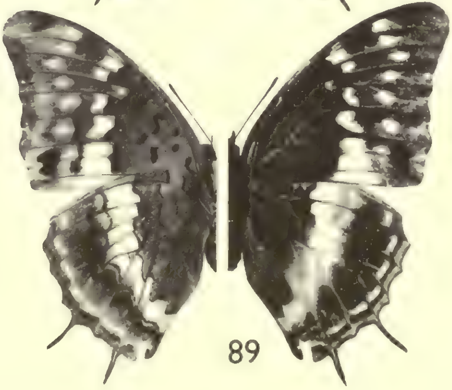

84


85


86


87


88


89

## PLATE 11

### *Charaxes etheocles* (Cramer)

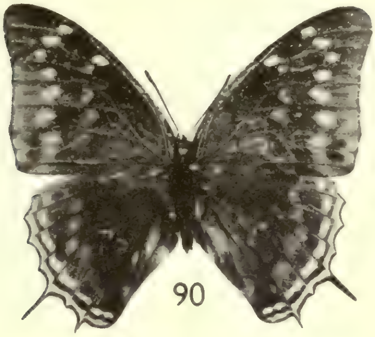
Figs. 94 & 90. *ochracea* Roths. ♀ form *seriata* Roths. Type. (Gabon: Ogowe River), upper and underside. Photos B.M. (N.H.) Nos. 34019; 34020.

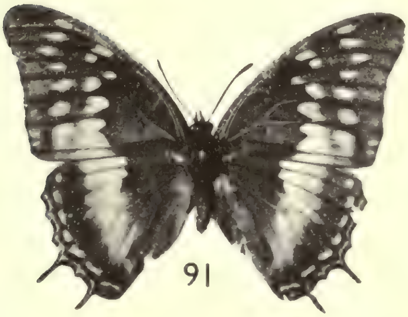
Figs. 91 & 95. *ochracea* Roths. ♀ Type (Gabon), upper and underside. Photos B.M. (N.H.) Nos. 34017; 34018.

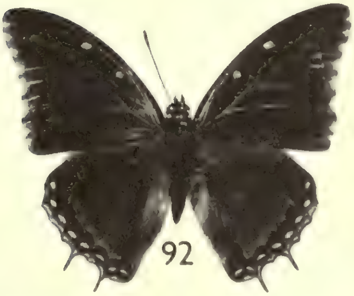
Figs. 92 & 96. *biinclinata* form *ephyra* Gdt. ♂. (Moyen Congo: Etumbe, i. 1963) (*Jackson*). Fore wing with subcostal blue spots; glaucous on margin. Hind wing with distinct blue submarginal spots. Underside ground colour brownish grey, fore wing pattern faint; satiny bars in hind wing strong. Form *ephyra* Gdt., upper and underside.

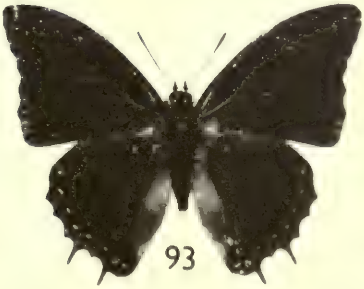
Figs. 93 & 97. *biinclinata* form *catochrous* Staud. ♂. (Moyen Congo: Kelle, x. 1962) (*Jackson*). Fore wing above almost immaculate, hind wing submarginal spots obscured. Underside: basal half of wings silvery up to discal zone; fore wing pattern strong, upper and underside.

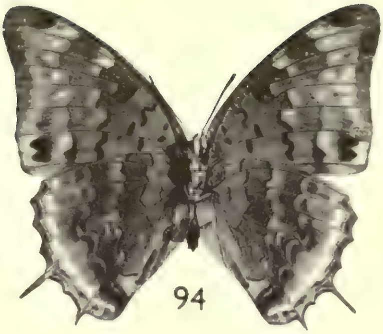
Approx. 2/3 nat. size.

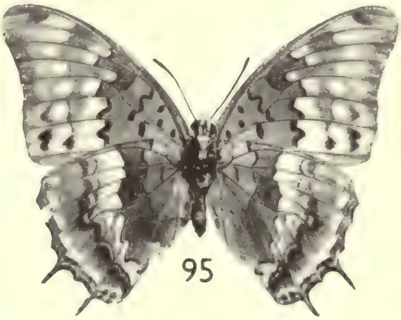

90

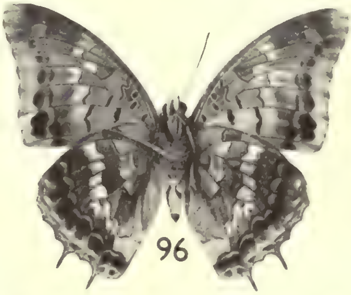

91

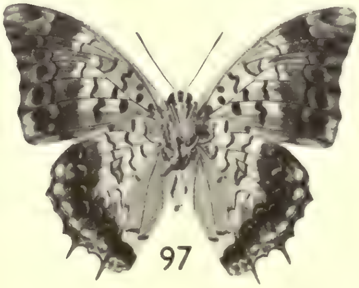

92


93


94


95


96


97

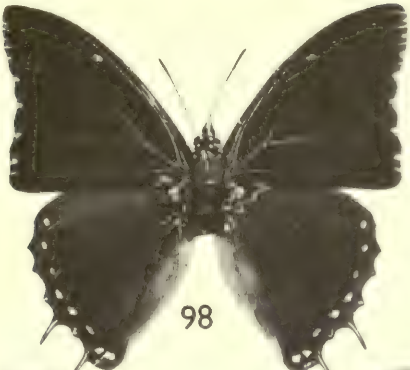
## PLATE 12

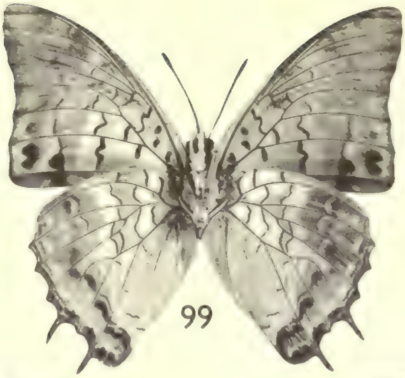
*Charaxes grahamei* sp. nov.

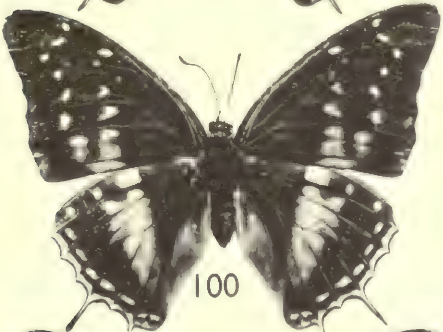
Upper and undersides.

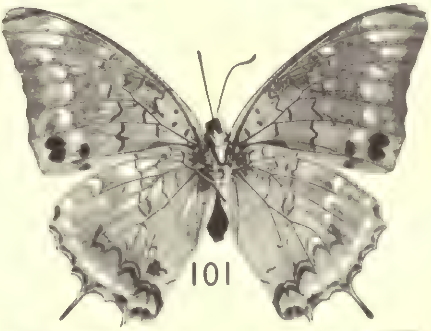
| | |
|---|---|
| FIGS. 98 & 99. | ♂ Type. (Tanzania [Tanganyika]: Mkuyu Forest, Kigoma district) (*Grahame*, 1964). |
| FIGS. 100 & 101. | ♀ Type. (Tanzania [Tanganyika]: Mukuyu Forest, Kigoma district) (*Grahame*, 1965). |
| FIGS. 102 & 103. | ♀ form *lacteata* f. nov. Type. (Tanzania [Tanganyika]: Mukuyu Forest, Kigoma Area) (*Grahame*, 1965). |
| FIGS. 104 & 105. | ♀ (Tanzania [Tanganyika]: Muhino Forest, Kigoma district) (*Jap. Primate Expdt.* 1965). |

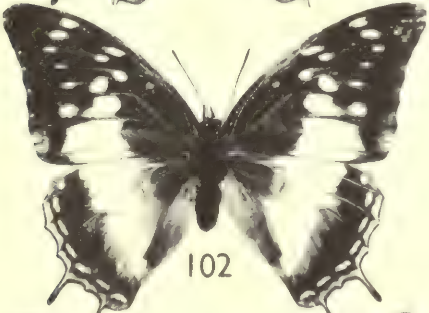
Approx. 2/3 nat. size.

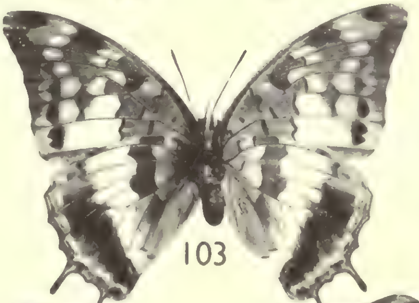

98

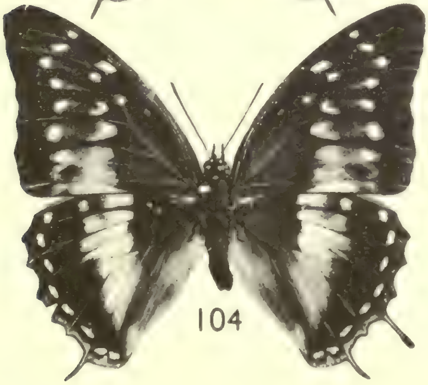

99

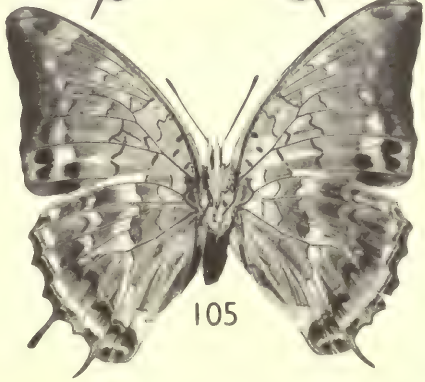

100


101


102


103


104

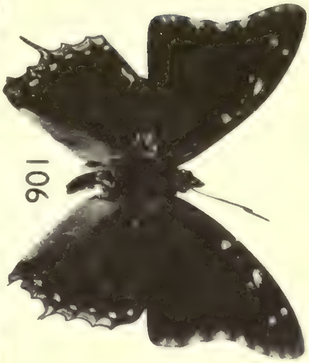

105

## PLATE 13

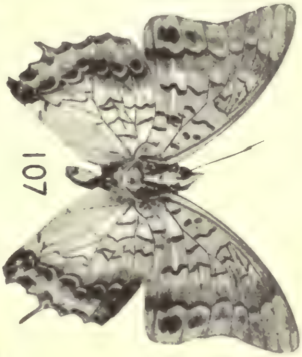
*Charaxes*

| | |
|---|---|
| FIGS. 106 & 107. | *contrarius* Weymer Type ♂ (German E. Africa) (In Berlin Museum), upper and underside. |
| FIG. 108. | *contrarius* Weymer ♂. (Kenya Coast: Zombo Forest, Kwale Dist.) (*Rydon*). Intensely black on upper surface; marginal border hind wing obscured; underside with very strong dark post-discal band, upper and underside. |
| FIG. 109. | *contrarius* ♀ form *contrarius* var. *pseudorosae* van Someren & Jackson. (Kenya: Forests of Shimba Hills, Kwale District), upper and underside. |
| FIG. 110. | *contrarius* ♀ *conjugens* forma n. (Kenya: Forests of Shimba Hills, Kwale District) (*van Someren & Rydon*), upper and underside. |
| FIG. 111. | *contrarius* ♀ form *contrarius* var. Fore wing with extra spot in cell; spots conjoined in 2–3; all marks creamy. Shape falcate. Hind wing band white, bluish on borders, upper and underside. |
| FIG. 112. | *contrarius* ♀ form *contrarius* var. Fore wing spots to 2 small, well separated; all spots white Hind wing band white crosses inner fold, upper and underside. |
| FIGS. 113 & 114. | ♂ *petersi* sp. n. Holotype. (Liberia: Kitoma, viii. 1953) (*W. Peters*) upper and underside. |

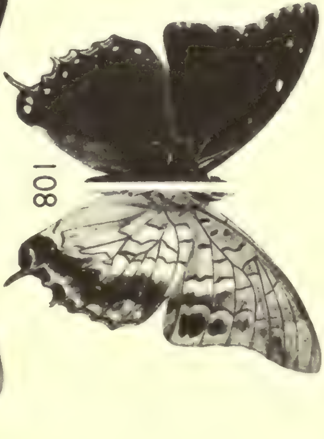
Approx. 2/3 nat. size.



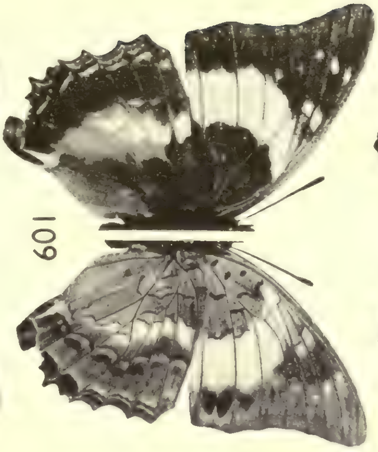
106



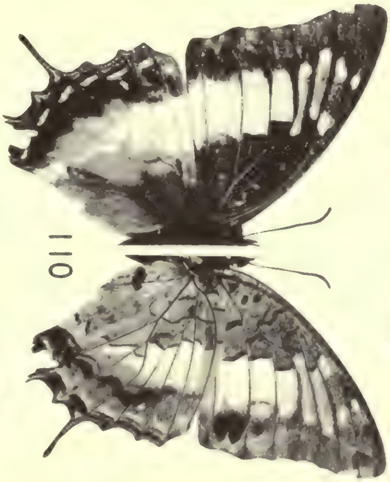
107



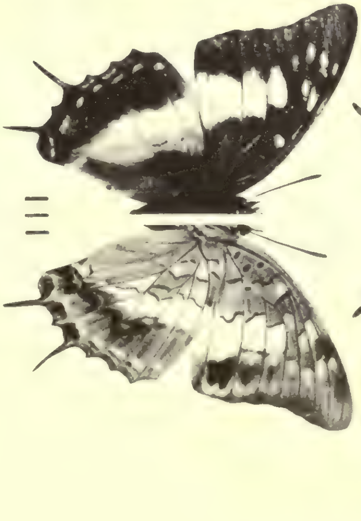
108



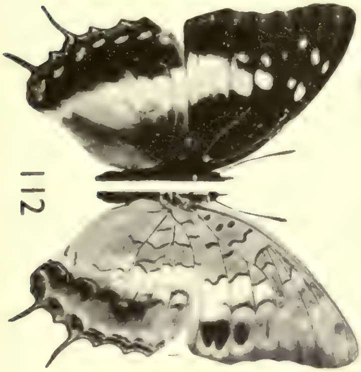
109



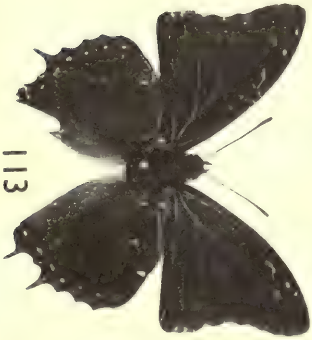
110



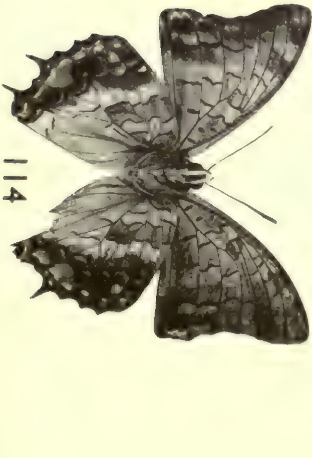
111



112



113



114

## PLATE 14

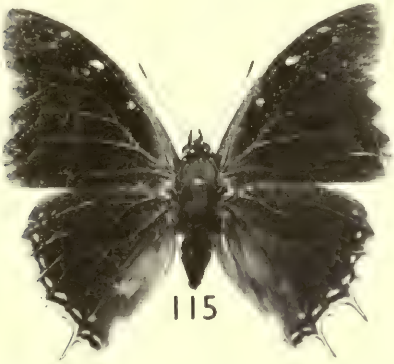
### *Charaxes baileyi* van Someren

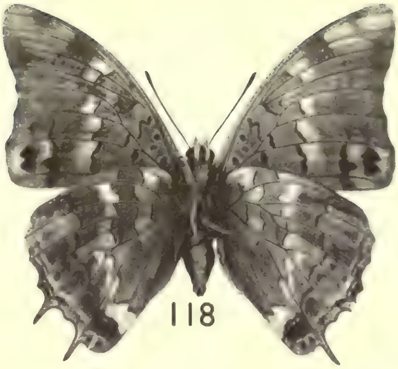
Figs. 115 & 118. ♂ Holotype. (Kenya: Visoi Gap, near Kilombe Hill, 3.ii.1957) [In B.M. (N.H.)], upper and underside. Photos B.M. (N.H.) Nos. 42566; 42568.

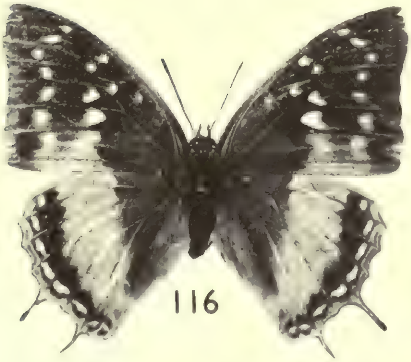
Figs. 116 & 119. ♀ Allotype. (Kenya: Visoi Gap, near Kilombe Hill, 3.ii.1967) [In B.M. (N.H.)], upper and underside. Photos B.M. (N.H.) Nos. 42565; 42567.

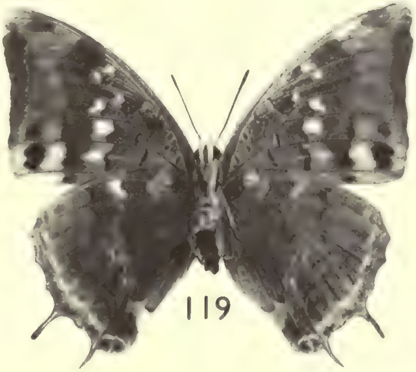
Figs. 117 & 120. ♀ form *pseudocarpenteri* van Someren. (Kenya: Visoi Gap, Kilombe Hill, western side of central rift), upper and underside.

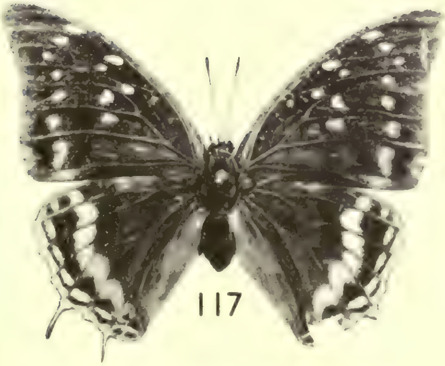
Approx. 3/4 nat. size.

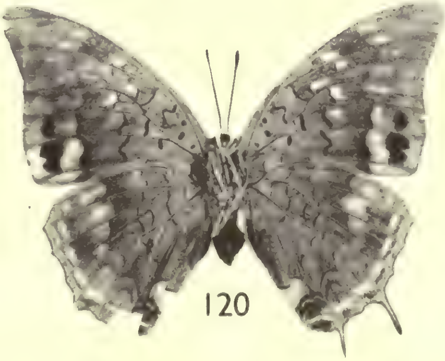

115


118


116


119


117


120

## PLATE 15

*Charaxes viola* Butler

FIGS. 121 & 122. *viola* Butler ♀ Type [In B.M. (N.H.)], upper and underside. Photos B.M. (N.H.) Nos. 38828; 38829.

FIGS. 123 & 124. *viola* Butler, typical ♂ (French W. Africa: Bamako), upper and underside.

FIGS. 125 & 126. *viola* ♀ form *viola* var. (W. Africa), upper and underside.

FIGS. 127 & 128. *picta* Rothschild ♂ Type. (Uganda: Unyoro). The underside is usually plain. Type in B.M. (N.H.), upper and underside. Photos B.M. (N.H.). Nos. 38825; 38830.

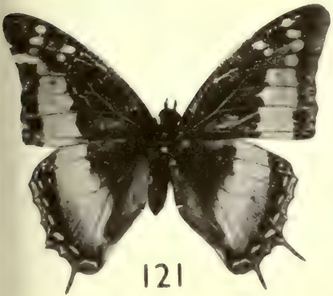
FIG. 129. *picta* Rothschild ♂. Very strongly marked. (Uganda: Mpanga, Fort Portugal), upper and underside.

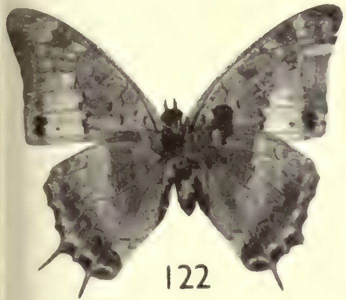
FIG. 130. *picta* ♀ f. *picta* Rothschild. (Uganda: Jinja Area, Busoga), upper and underside.

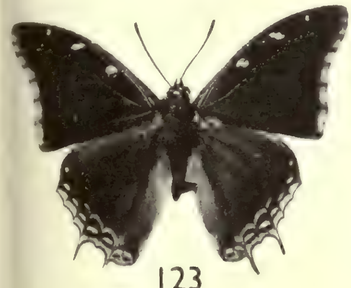
FIG. 131. *picta* ♀ form *vansomereni* Poulton. (Uganda: Jinja Area, Busoga), upper and underside.

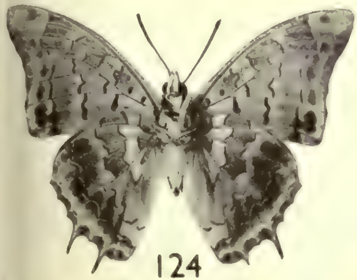
FIG. 132. *picta* ♀ form *vansomereni* Poulton var. (Uganda: Jinja Area), upper and underside.

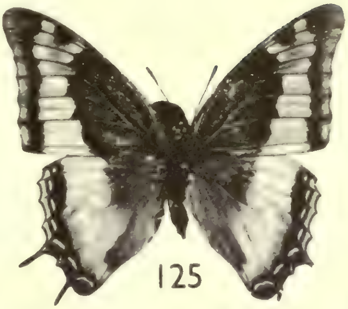
Approx. 2/3 nat. size.

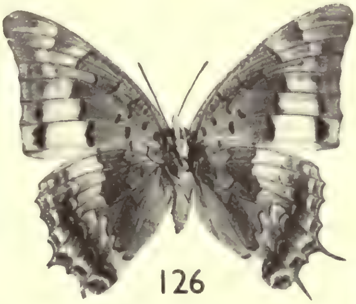

121

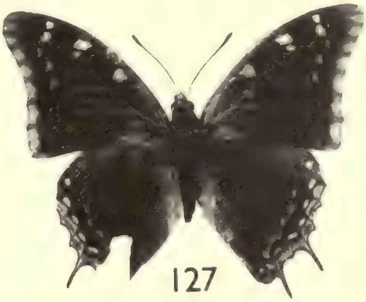

122

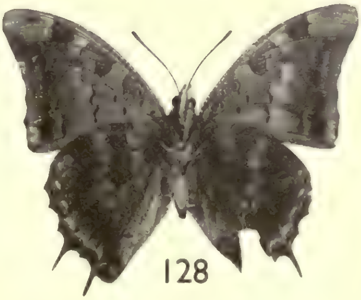

123

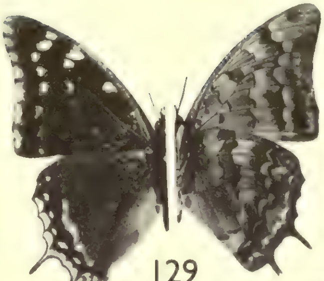

124

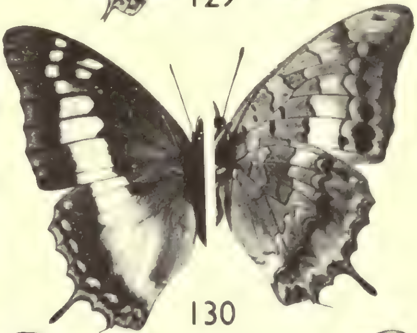

125

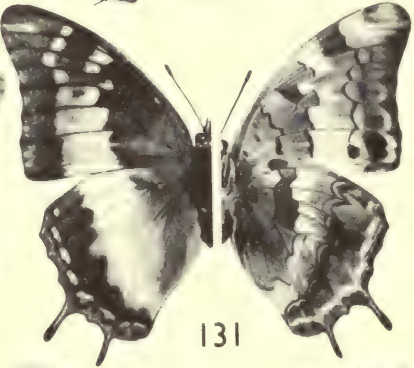

126

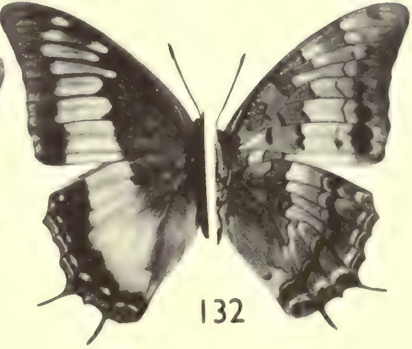

127


128


129


130


131

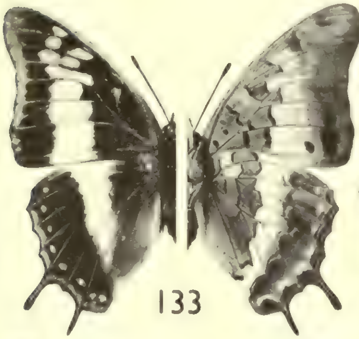

132

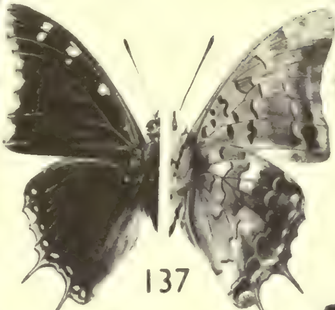
## PLATE 16

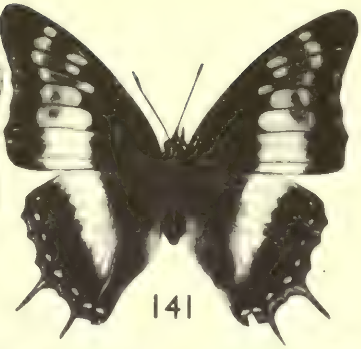
### *Charaxes viola* Butler

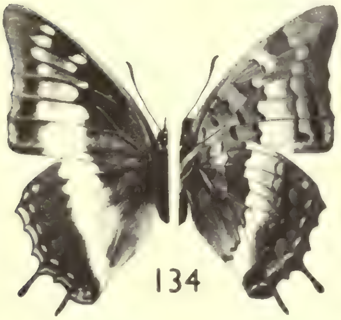
| | |
|---|---|
| Fig. 133. | *kirki* Butler, ♀ form *albifascia* Poulton. Narrow hind wing band, upper and underside. |
| Fig. 134. | *kirki* Butler, ♀ form *rogersi* Poulton. (Kenya: Mile 29, Magadi Rd., Masai), upper and underside. |
| Fig. 135. | *kirki* Butler, ♀ form *kirki* Butler. (Kenya: Masai Reserve.) Upper and underside. |
| Fig. 136. | *kirki* Butler, ♂ typical specimen (Kenya: Mile 29, Magadi Rd., Masai Reserve.) Upper and underside. |
| Fig. 137. | *kirki* Butler, ♂ well marked specimen. (Kenya: Mile 29, Magadi Rd., Masai Reserve.) Upper and underside. |
| Figs. 138 & 139. | *suk* Carpenter & Jackson, typical ♂. (Kacheliba, Suk). Upperside and underside. |
| Fig. 140. | *suk* Carpenter & Jackson, ♀ form *intermedia* Carpenter & Jackson. Upperside. |
| Fig. 141. | *suk* Carpenter & Jackson, ♀ form *kirkoides* Carpenter & Jackson. Upperside. |
| Fig. 142. | *suk* Carpenter & Jackson ♀ form *achaemenesopsis* Carpenter & Jackson. (Kacheliba, Suk.). Upper and underside. |
| Fig. 143. | *suk* Carpenter & Jackson, ♀ form *albifascia* Carpenter & Jackson. Wide fore wing bar. (Kacheliba Suk). Upper and underside. |
| Fig. 144. | *suk* Carpenter & Jackson, ♀ form *albifascia* Carpenter & Jackson. (Kacheliba, Suk). Narrow fore wing bar. Upper and underside. |

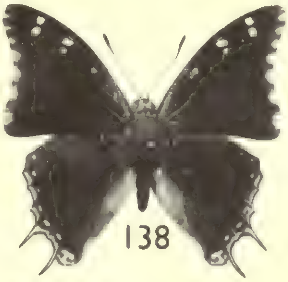
Approx. 2/3 nat. size.

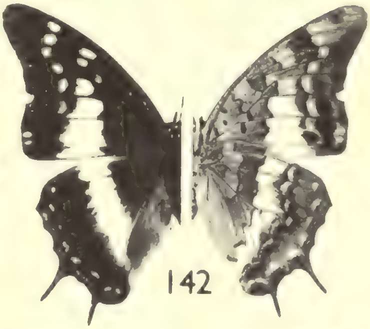

133

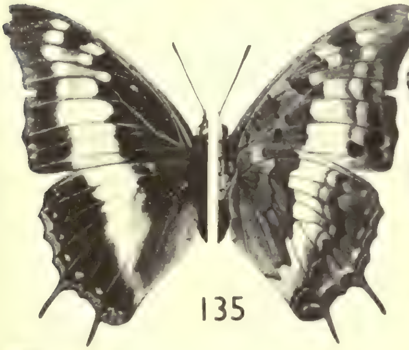

137

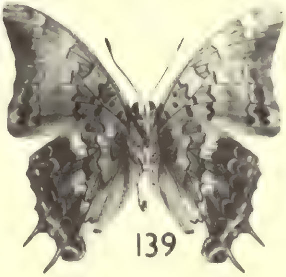

141

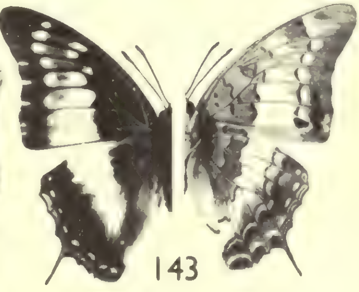

134

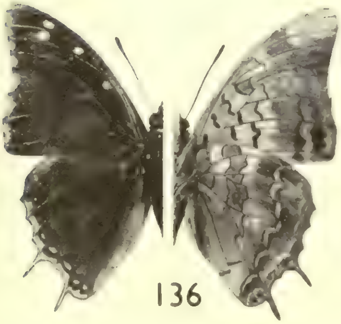

138

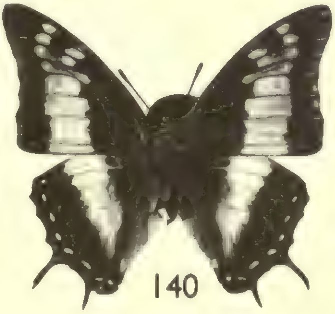

142

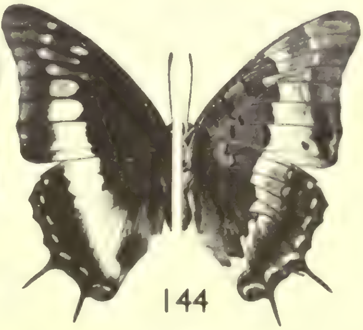

135


139


143


136


140


144

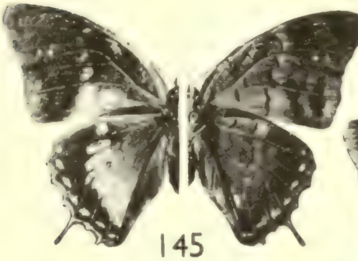
## PLATE 17

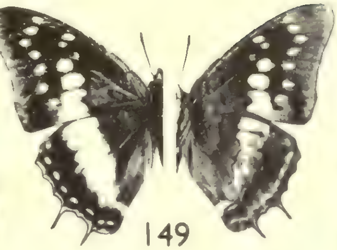
*Charaxes viola* Butler

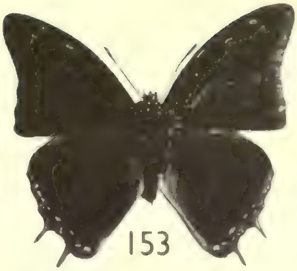
Upper and undersides.

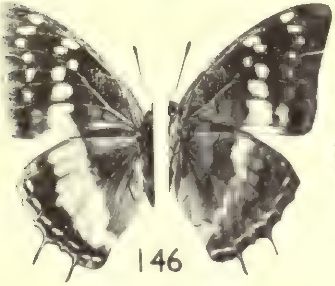
FIG. 145. *loandae* ssp. n. ♀ form *violitincta* forma n.
FIG. 146. *loandae* ssp. n. ♀ form *loandae* forma n. Allotype.
FIG. 147. *loandae* ssp. n. ♀ form *instabilis* forma n.
FIG. 148. *loandae* ssp. n. ♀ form *protokirki* forma n.
FIG. 149. *loandae* ssp. n. ♀ form *vansonoides* forma n.
FIG. 150. *loandae* ssp. n. ♂ Holotype. (N. W. Angda: Dundo Area, Loanda).
FIG. 151. *loandae* ssp. n. ♀ form *basiviridis* forma n.
FIG. 152. *loandae* ssp. n. ♀ form *primitiva* forma n.
FIGS. 153 & 154. *brainei* van Son. Type ♂ (S.W. Africa: Kombat, iv.1965). Photo. Transvaal Museum.
FIGS. 155 & 156. *brainei* van Son. Type ♀ (S.W. Africa: Kombat, iv.1965). Photo. Transvaal Museum.

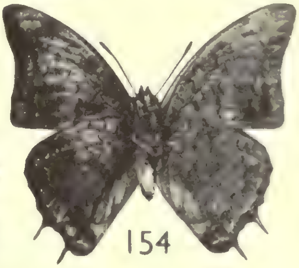
Approx. 2/3 nat. size.

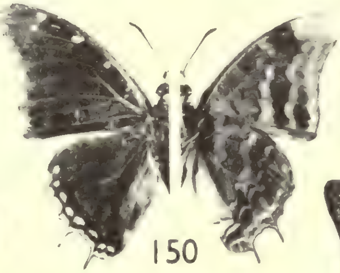

145

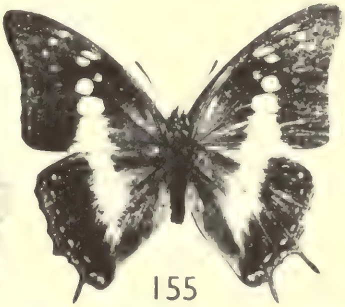

149

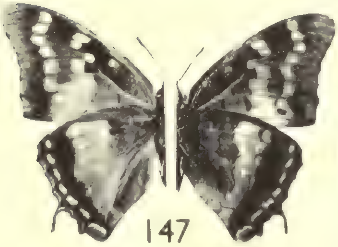

153

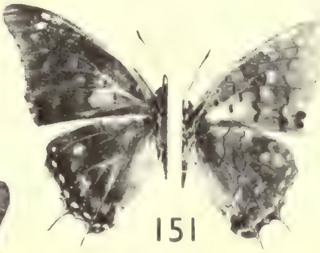

146

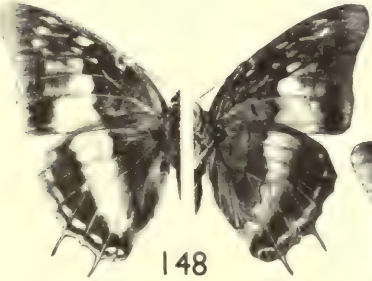

154

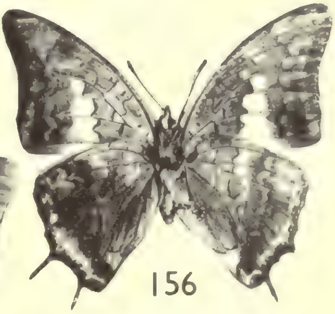

150

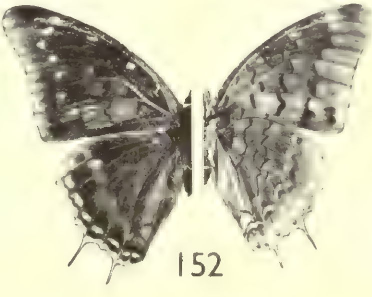

155


147


151


148


156


152

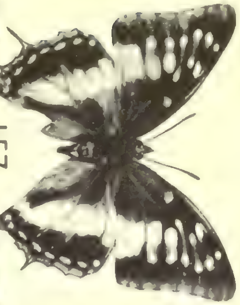
## PLATE 18

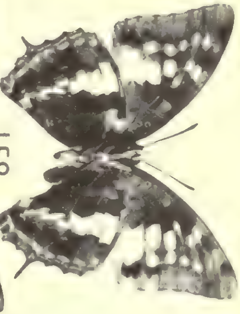
*Charaxes viola diversiforma* van Someren & Jackson

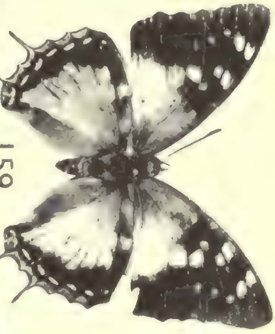
Upper and undersides.

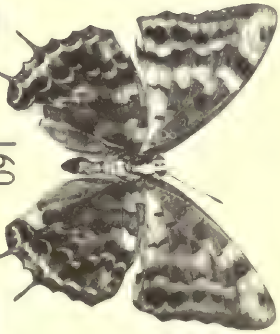
| | |
|---|---|
| Figs. 157 & 158. | ♀ form *purpurea* Paratype. |
| Figs. 159 & 160. | ♀ form *albocaerulea* Paratype. |
| Figs. 161 & 170. | ♀ form *albimacula* Paratype. |
| Figs. 163 & 164. | ♀ form *viridicaerulea* Paratype. |
| Figs. 165 & 166. | ♀ form *caerulescens* Paratype. |
| Figs. 167 & 168. | ♀ form *ochremaculata* Paratype. |
| Figs. 169 & 162. | ♀ form *diversiforma* Paratype. |
| Fig. 171. | ♀ form *cupreopurpurea*. |
| Fig. 172. | Typical ♂ form *diversiforma*. S. Kalanga, Congo. |

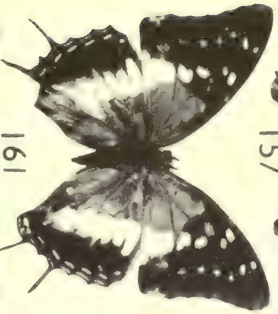
Approx. 2/3 nat. size.

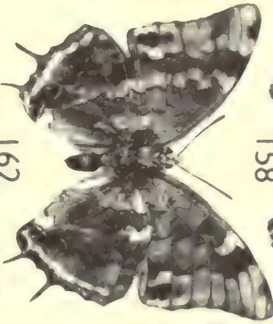

157

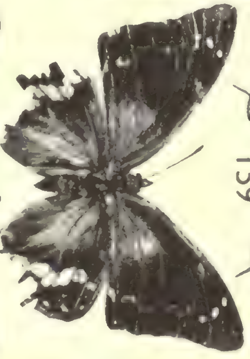

158

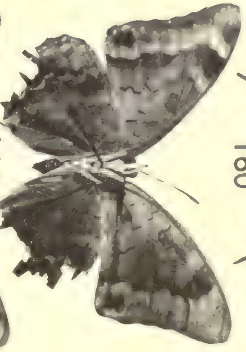

159

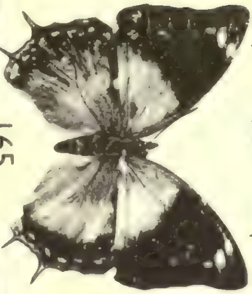

160

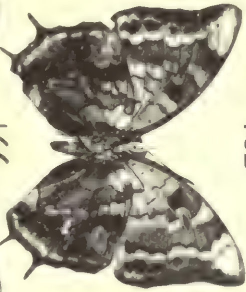

161

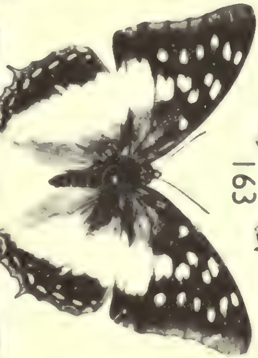

162

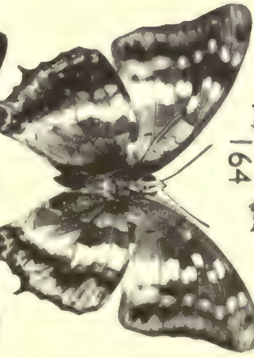

163

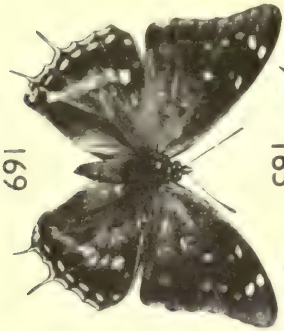

164

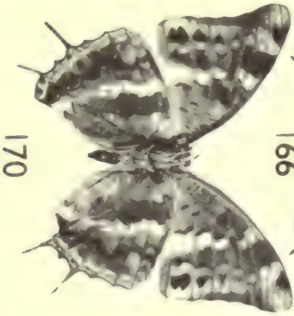

165

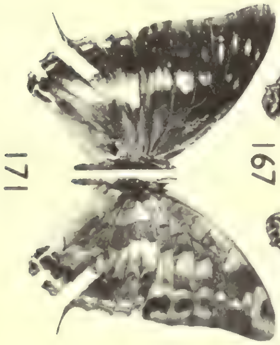

166

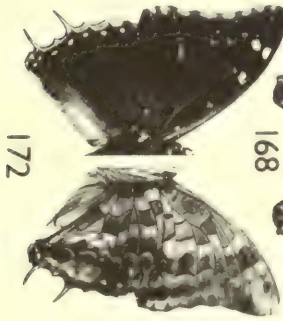

167


168


169


170


171


172

## PLATE 19

*Charaxes viola variata* ssp. n.

FIGS. 173 & 174. ♀ form *variata* forma n. Type. [Zambia (N. Rhodesia): Mwinilunga, Kabongo Rd. (*C. B. Cottrell*)], upper and underside.

FIGS. 175 & 176. ♀ form *rosella* forma n. Type. [Zambia (N. Rhodesia): Mwinilunga, Kabongo Rd.], upper and underside.

FIGS. 177 & 178. ♀ form *cottrelli* forma n. Type. [Zambia (N. Rhodesia): Mwinilunga, Kabongo Rd. (*C. B. Cottrell*)], upper and underside.

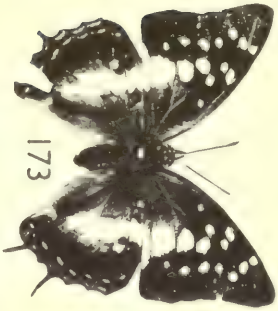
FIGS. 179 & 180. ♀ form *rosella* var. [Zambia (N. Rhodesia): Mwinilunga, Kabongo Rd. (*C. B. Cottrell*)], upper and underside.

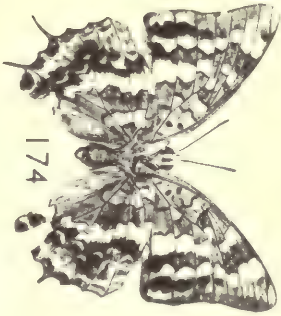
FIG. 181. Typical ♂. [Zambia (N. Rhodesia): Mwinilunga, Kabongo Rd.], upper and underside.

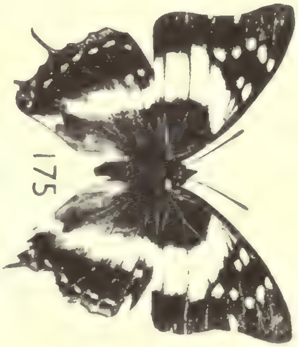
FIG. 182. Typical ♂. [Zambia (N. Rhodesia): Mwinilunga], upper and underside.

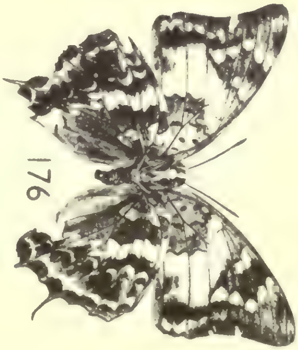
FIGS. 183 & 184. ♀ form *tricolor* forma n., upper and underside.

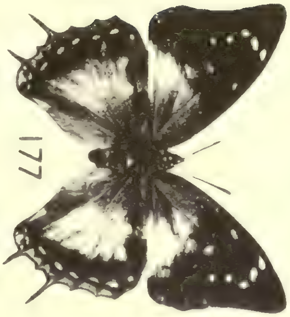
Approx. 2/3 nat. size.

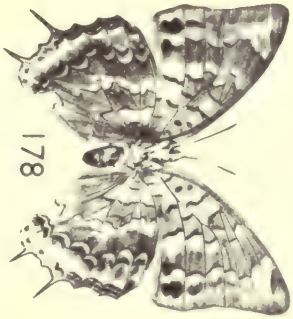

173

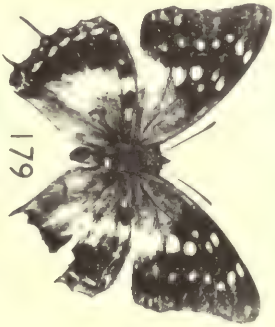

174

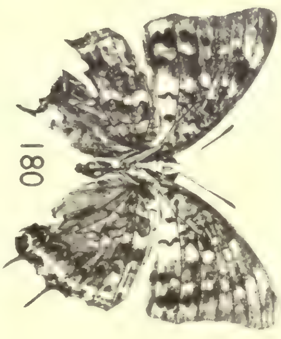

175

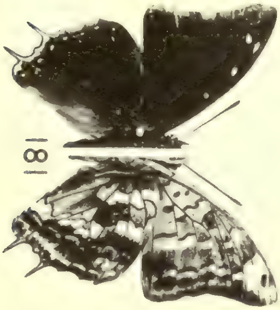

176

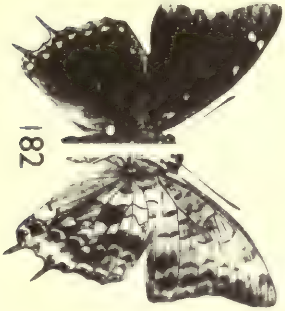

177

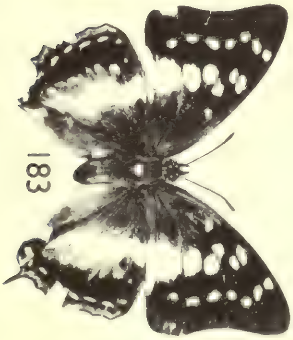

178

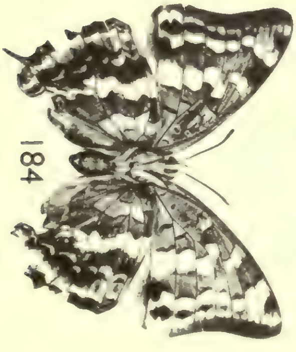

179


180


181


182


183

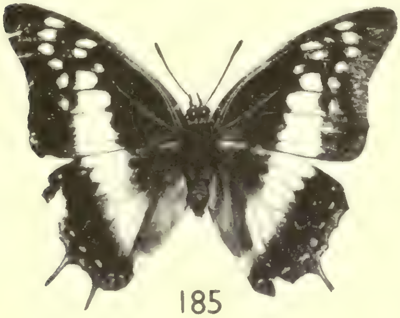

184

## PLATE 20

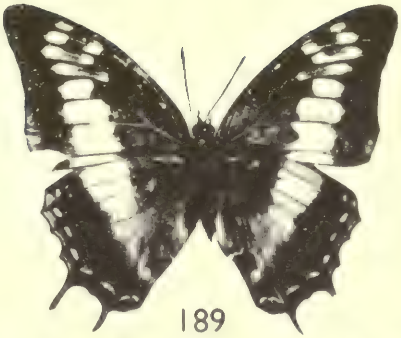
*Charaxes viola* Butler

| | |
|---|---|
| FIGS. 185 & 186. | *daria* Rothschild. Type ♀, upper and underside. Photos B.M. (N.H.) Nos. 33653, 33654. |
| FIG. 187. | *daria* Rothschild. Typical ♂ (Abyssinia: Jabalo, Gillet Mts.), upper and underside. |
| FIGS. 188 & 192. | *viola handari* Type ♀ (Tanzania [Tanganyika]), upper and underside. |
| FIGS. 189 & 190. | *chanleri* Holland. Type ♀ (S. Abyssinia), upper and underside. |
| FIG. 191. | *chanleri* Holland. ♂ (N.E. Mt. Kenya: Meru), upper and underside. |

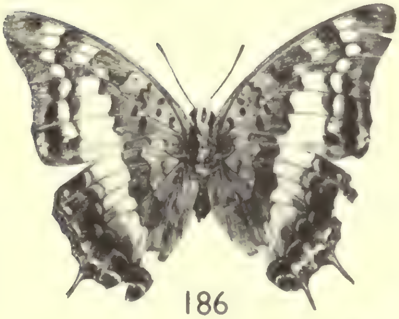
Approx. 2/3 nat. size.



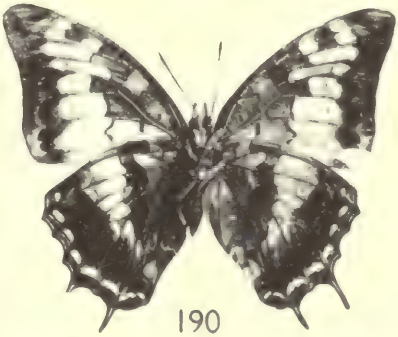
185



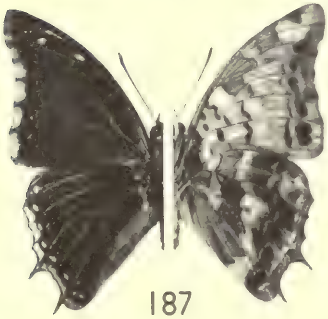
189



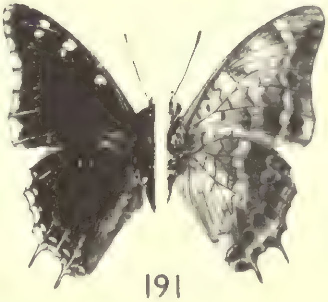
186



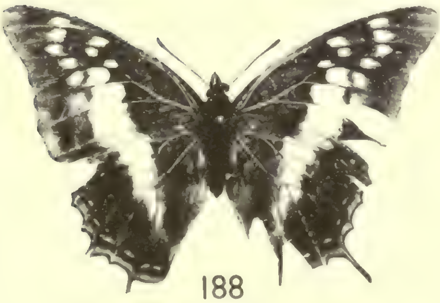
190



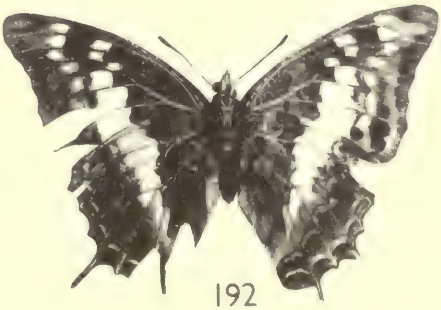
187



191



188



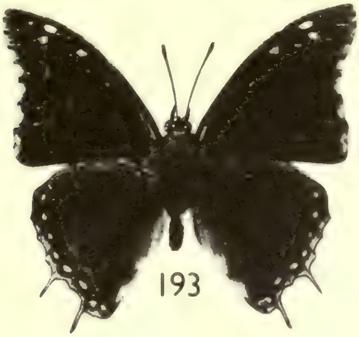
192

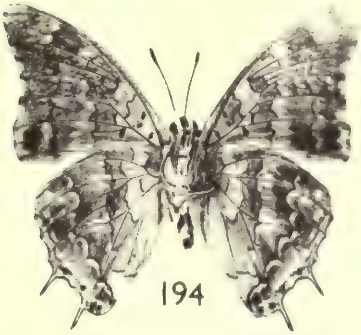
## PLATE 21

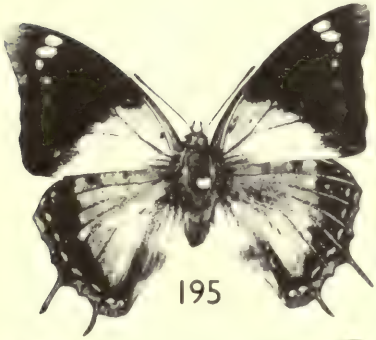
*Charaxes viola phaeus* Hewitson

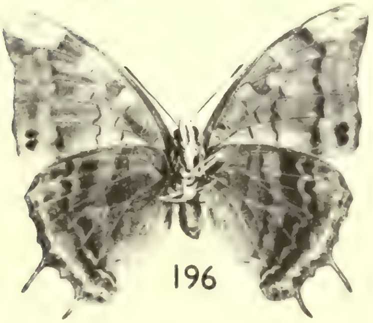
| | |
|---|---|
| Figs. 193 & 194. | ♂ (Zomba Plateau), upper and underside. |
| Figs. 195 & 196. | ♀ (Malawi [Nyasaland]: Limbe), upper and underside. |
| Fig. 197. | ♀ form *phaeus* Hewitson (W. Lake Victoria: Kitigati, Kagera River), upper and underside. |
| Fig. 198. | ♂ (W. Lake Victoria: Kitigati, Kagera River), upper and underside. |
| Figs. 199 & 200. | ♀ form *vansoni* van Someren & Jackson. (Bechuanaland: Mahalapya Drift) (*Pennington*), upper and underside. |

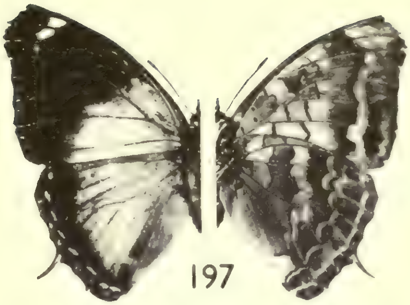
Approx. 2/3 nat. size.

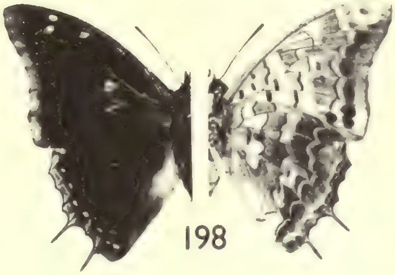

193

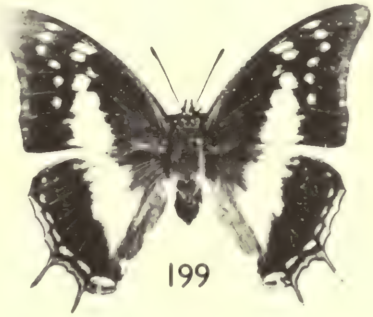

194

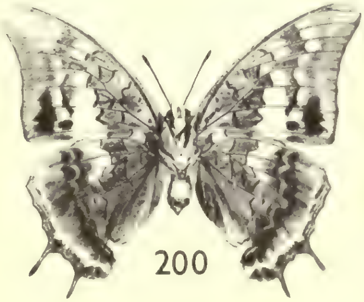

195


196


197


198


199

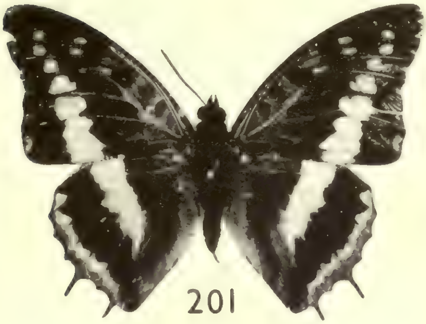

200

## PLATE 22

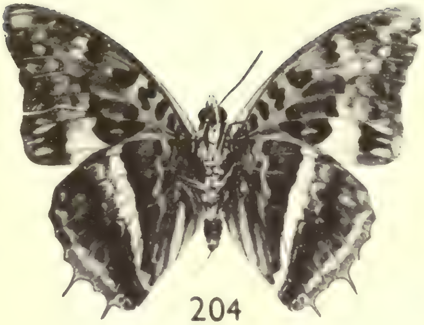
*Charaxes cynthia* Butler

FIGS. 201 & 204. ♂ Type. Upper and underside. Photos B.M. (N.H.) Nos. 39937, 39938.
FIGS. 202 & 205. = *guineensis* Le Moult, ♂ Type. Upper and underside.
FIGS. 203 & 206. Nominate ♀ (Nigeria: Ikom, vi. 1957) (Jackson coll.). Upper and underside.

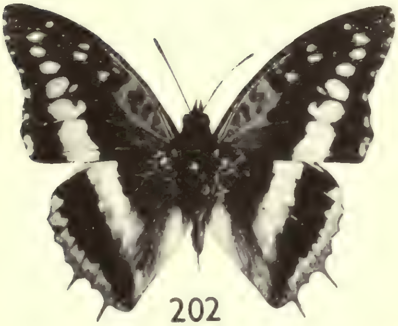
Approx 3/4 nat. size.



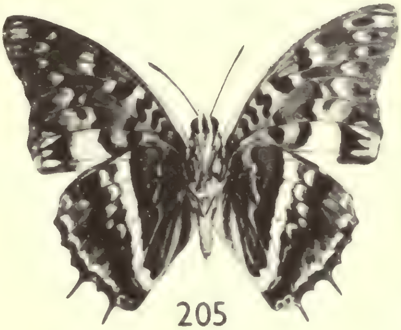
201



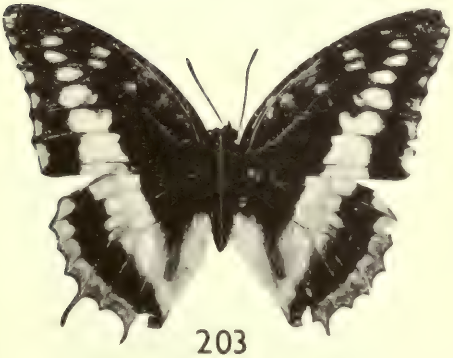
204



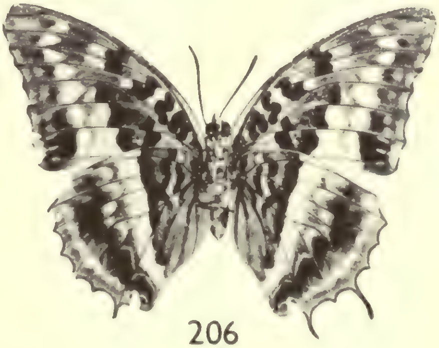
202



205



203



206

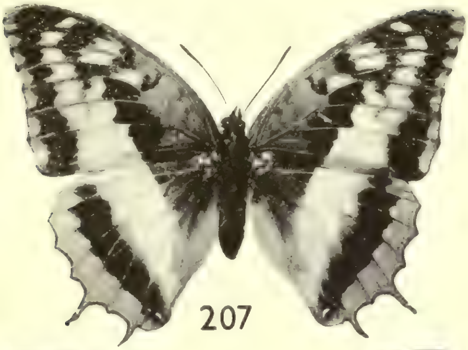
## PLATE 23

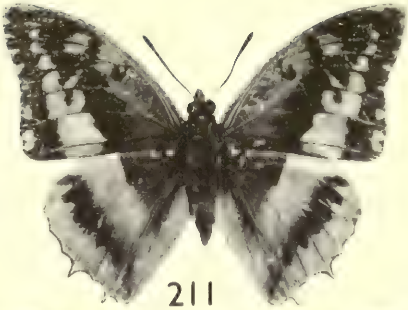
*Charaxes cynthia* Butler

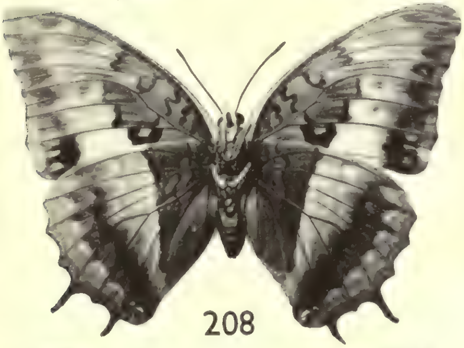
Upper and undersides.

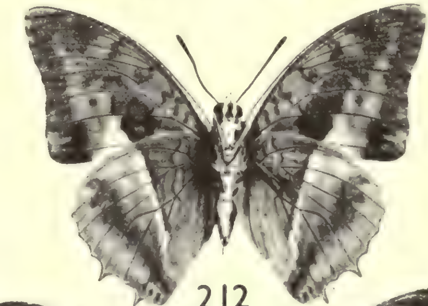
| | |
|---|---|
| Figs. 207 & 208. | *mukuyu* ssp. n. ♀ Type. (Mukuyu). Cf. with ♀ from Kafakumba, Katanga [B.M. (N.H.)]. |
| Figs. 209 & 210. | *propinqua* ssp. n. ♂ Type. (Uganda: Katera Forest, Masaka, xi.1953). |
| Figs. 211 & 212. | *mukuyu* ssp. n. ♂ (N.E. Lake Tanganyika: Forests of Mukuyu and Muhimo in the Kigoma District, iv.1965.) (*Grahame*). |
| Figs. 213 & 214. | *propinqua* ssp. n. ♀ Type (Uganda: Katera Forest, Masaka, xi.1953). |

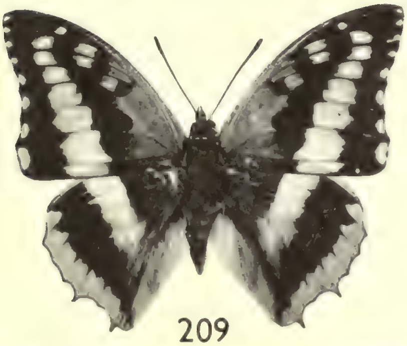
Approx. 2/3 nat. size.

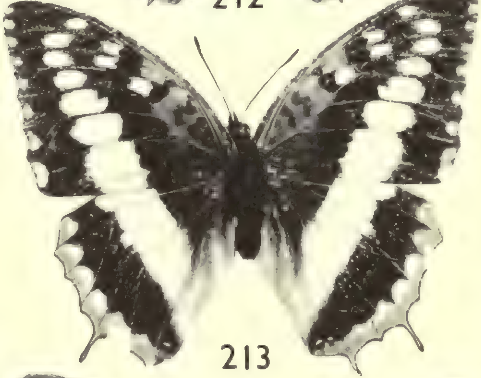

207

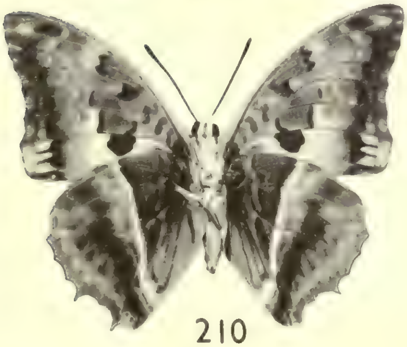

211

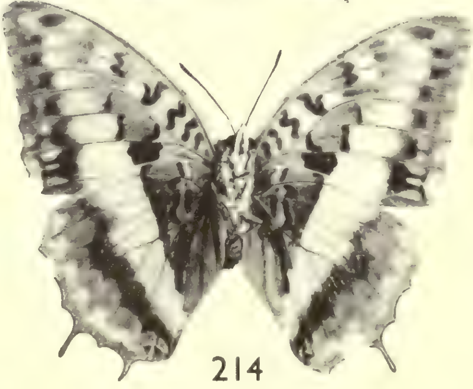

208


212


209


213


210


214

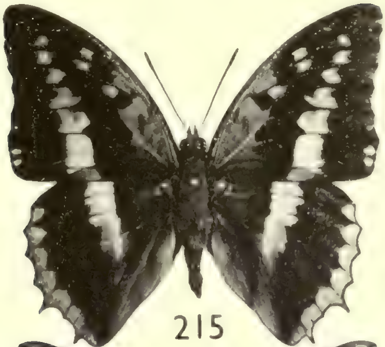
## PLATE 24

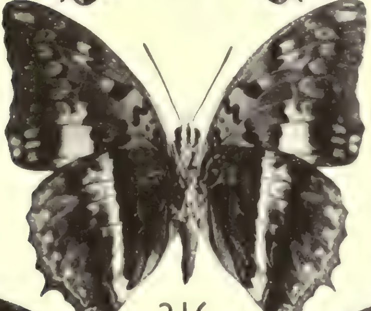
*Charaxes cynthia parvicaudatus* Lathy

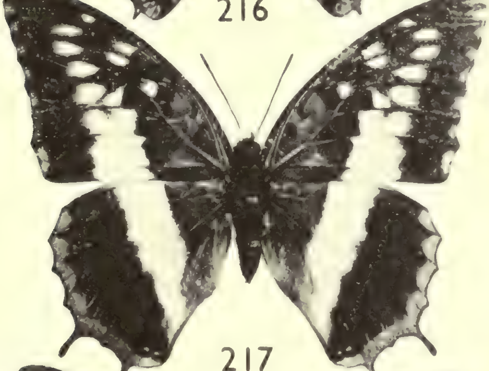
Upper and undersides.

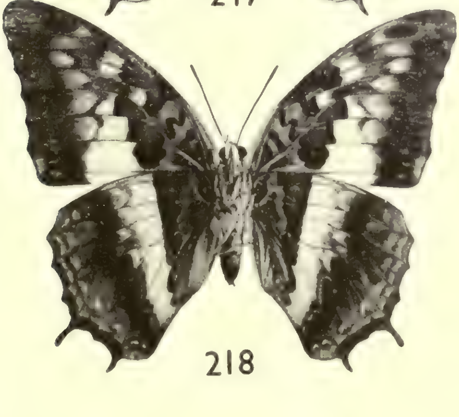
FIGS. 215 & 216. ♂ Type.
FIGS. 217 & 218. ♀ Type.
FIGS. 219 & 220. ♂ (N.W. Kenya: Kakamega Forest, ix. 1937) (M. Berkeley coll.).
FIGS. 221 & 222. ♀ (N.W. Kenya: Kakamega Forest, ix. 1937) (M. Berkeley coll.).

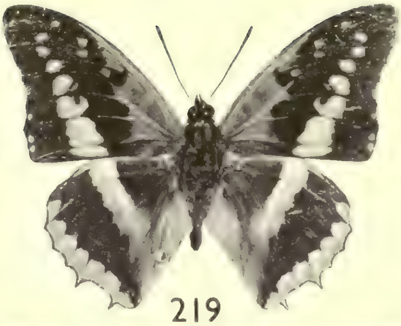
Approx. 2/3 nat. size.

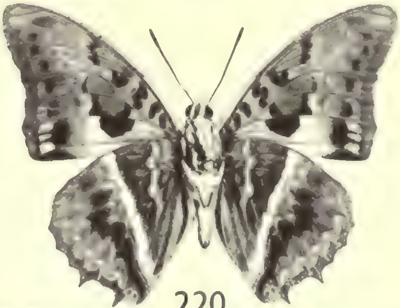

215

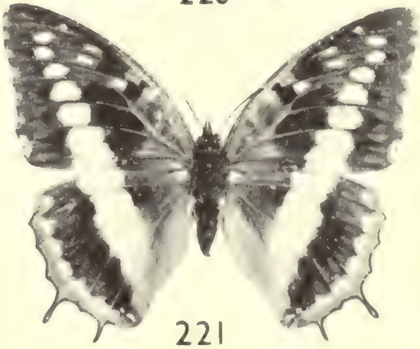

216

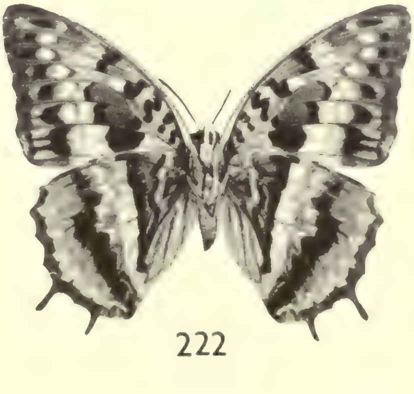

217


218


219


220


221


222

## PLATE 25

### *Charaxes cynthia sabulosus* Talbot

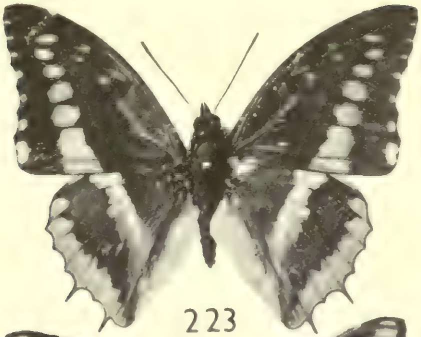
FIGS. 223 & 224. Dark form ♂ (Katanga: Kinda) " wet " form. cf. with dark specimen from Kafakumba, Katanga. Upper and underside.

FIGS. 225 & 226. Dark form ♀ *aurantaca* R.-D (Katanga: Kafakumba.) "wet" form. [B.M. (N.H.)]. Upper and underside.

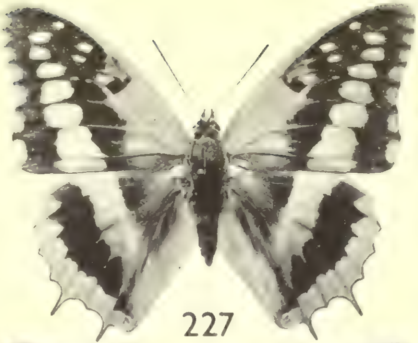
FIGS. 227 & 228. ♂ form *aurantiaca* R.-D (Katanga: Kafakumba.) " dry " form. Upper and underside.

FIGS. 229 & 230. ♂ " dry " form agreeing with Type. (Katanga: Kafakumba) (*Overlaet*). Upper and underside.

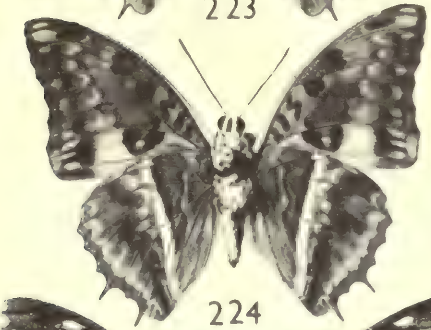
Approx. 2/3 nat. size.



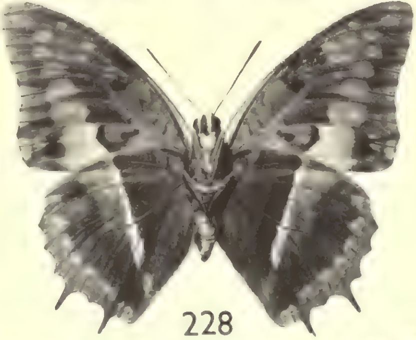
223



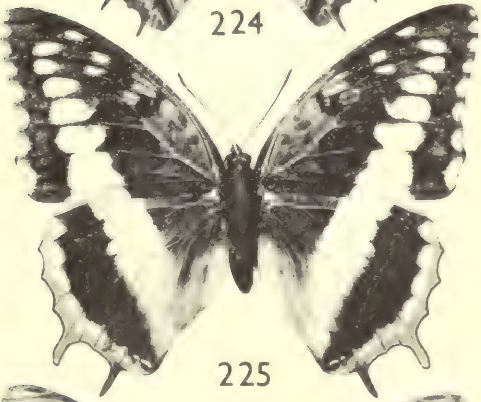
227



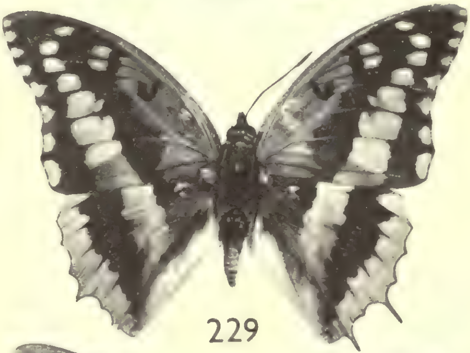
224



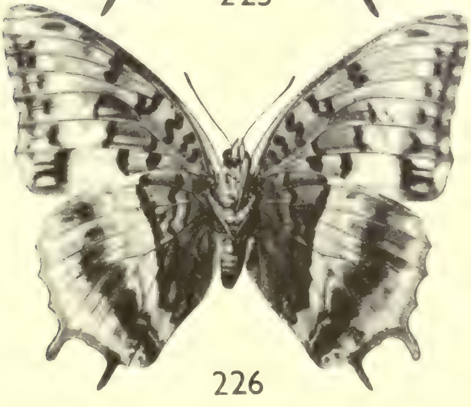
228



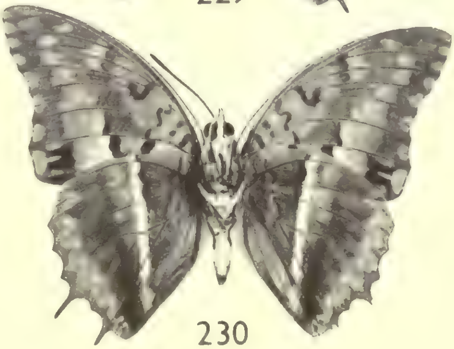
225



229



226



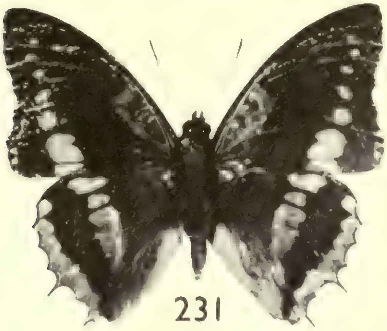
230

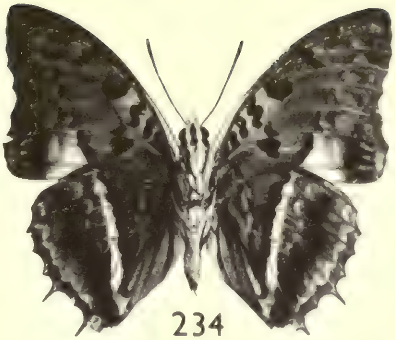
## PLATE 26

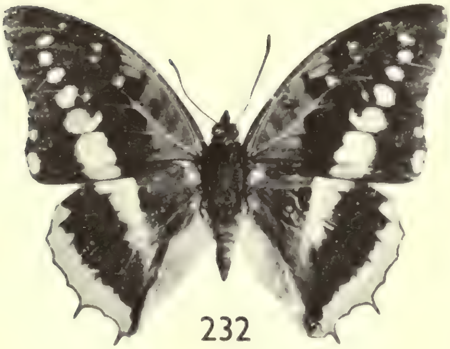
*Charaxes cynthia kinduana* Le Cerf
Upper and undersides.

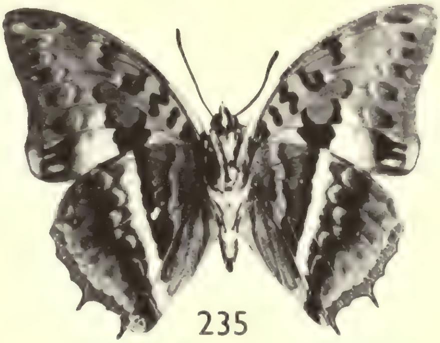
| | |
|---|---|
| FIGS. 231 & 234. | ♂ Type. |
| FIGS. 232 & 235. | ♀ (Congo: Medje, x. 1910) (Carnegie Mus., Pittsburgh). |
| FIGS. 233 & 236. | ♀ (Congo: Epulu, x. 1917) (*Jackson*). |

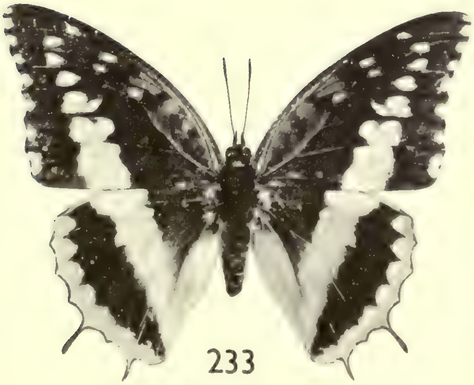
Approx. 3/4 nat. size.

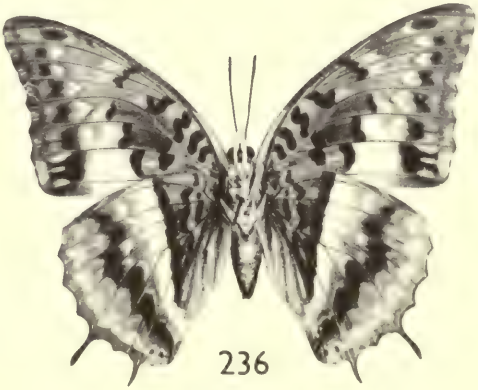

231


234


232


235


233

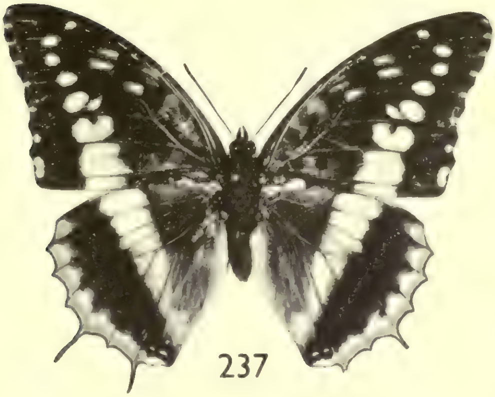

236

## PLATE 27

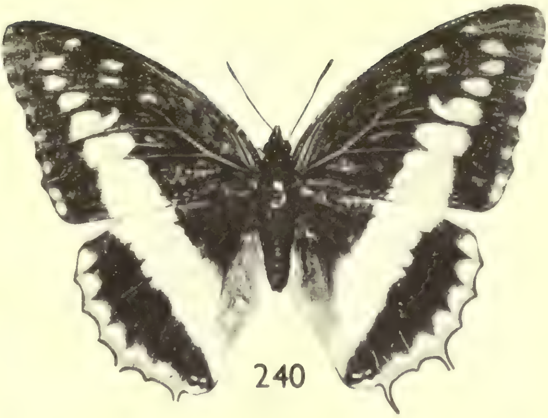
*Charaxes cynthia cameroonensis* van Someren

| | |
|---|---|
| Figs. 237 & 238. | ♀ Type, upper and underside. |
| Fig. 239. | ♂ (Central African Republic: Bangui, i.1961), upper and underside. |
| Figs. 240 & 241. | ♀ (Central African Republic: Bangui, i.1961), upper and underside. |
| Fig. 242. | ♂ (Cameroons: Meter, ii.1921), upper and underside. |

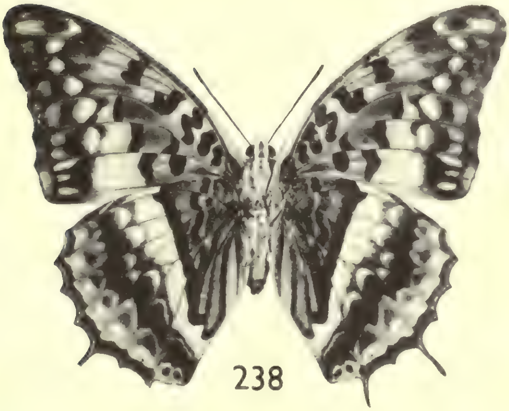
Approx. 3/4 nat. size.



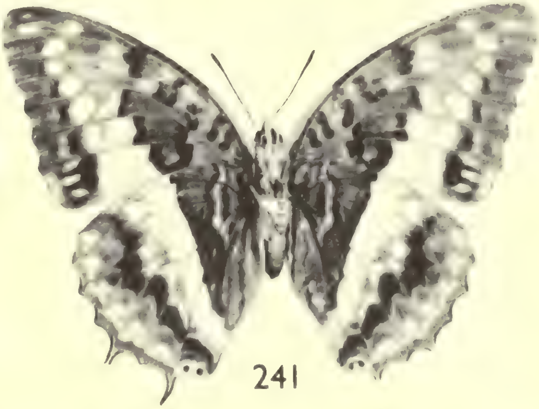
237



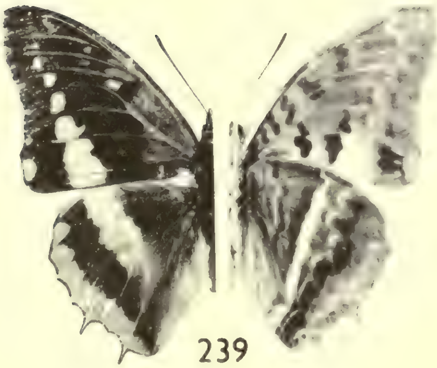
240



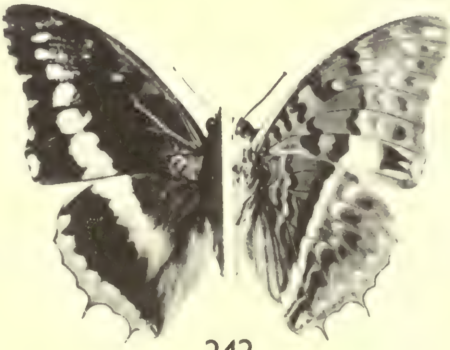
238



241



239



242

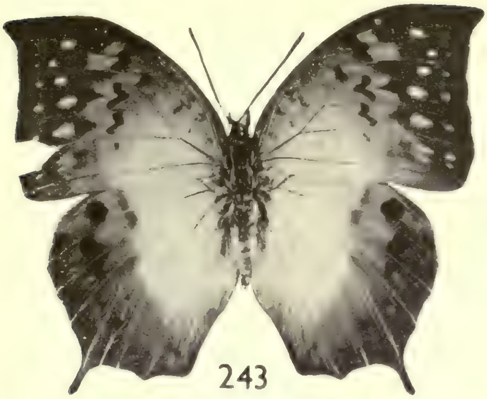
## PLATE 28

*Charaxes*

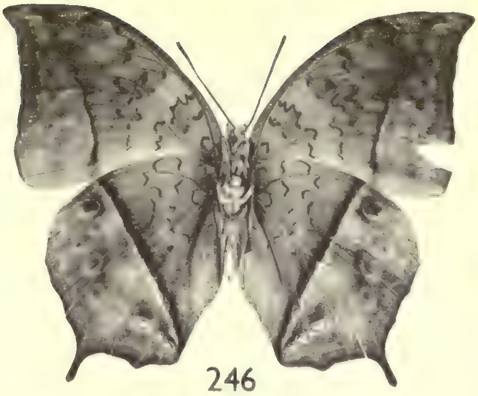
Figs. 243 & 246. *acuminatus obudoensis* ssp. n. ♂ Type (E. Nigeria: Obudo Plateau.). Upper and underside.

Figs. 244, 245, 247, 248. *xiphares kilimensis* ssp. n. 244 and 247 ♂ Type upper and underside; 245 and 248 ♀ Type upper and underside, (both Tanzania [Tanganyika]: Lower slopes of West Kilimanjaro, Maua Estate, ix.1966 and ii.1964).

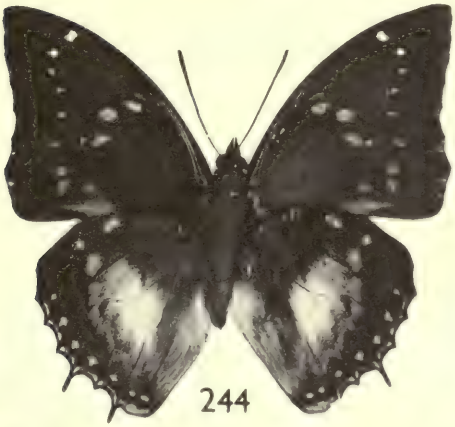
Approx. 2/3 nat. size.



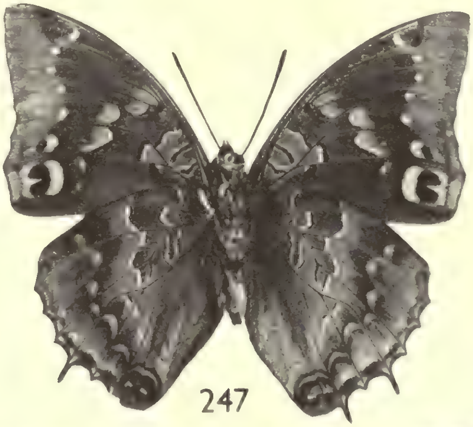
243



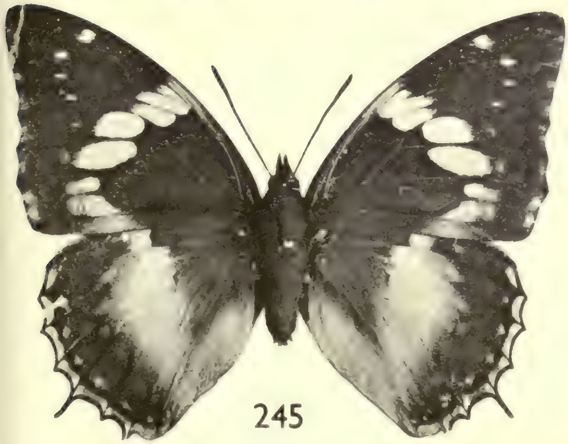
246



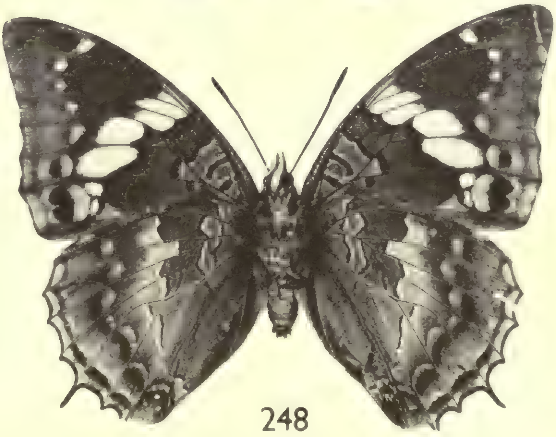
244



247



245



248

## PLATE 29

### *Charaxes*

FIGS. 249 & 250. *berkeleyi berkeleyi* ♀ form *ngonga* forma n. Type (Kenya: Karen, Ngong), upper and underside.

FIGS. 251 & 254. *druceanus tectonis* Jordan 251 ♂; 254 ♀ Neallotype (both E. Nigeria: Obudo Plateau, 5,200 ft., 6.iv.1966) (*Stephen Collins*), upper and underside.

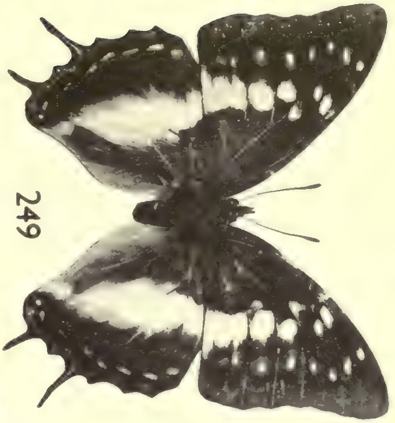
FIGS. 252 & 253. *berkeleyi masaba* ssp. n. ♀ forms. 252, fore wing spots well separated, orange ochreous; hind wing band broad at costa, white with blue borders. 253, fore wing spots rayed and tending to conjoin; orange tawny; hind wing band broad at costa. Cf. nominate *berkeleyi*, upper and undersides.

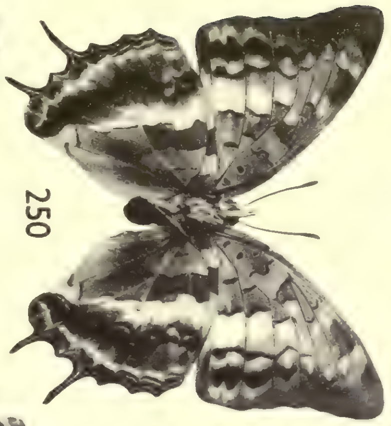
FIGS. 255 & 256. *penricei tanganyikae* ♀ form *caerulescens* forma n. Type. [Tanzania (Tanganyika): Kigoma Dist. Mukimo Forest] (*Jap. Primate Exped.* 1965), upper and underside.

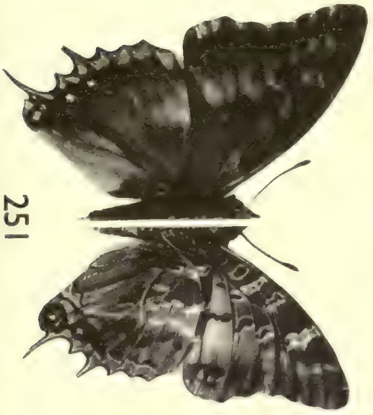
FIG. 257. *schoutedeni* Ghesq. (Type locality: Merode, Salvator, Kasai), upper and underside.

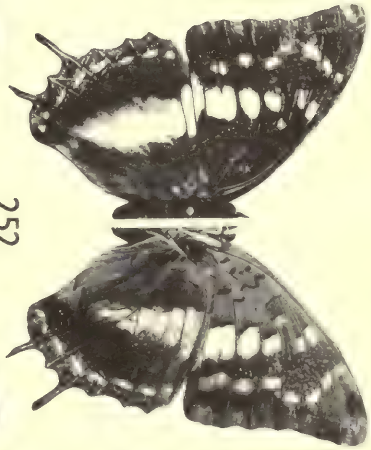
Approx. 2/3 nat. size.

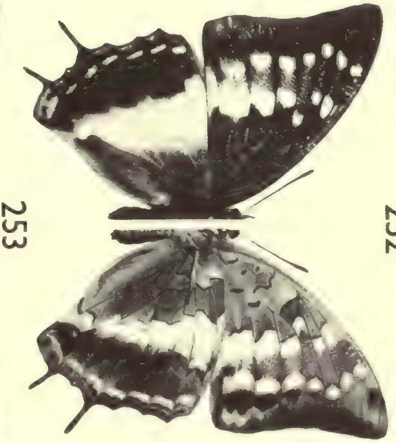
BRITISH MUSEUM (NATURAL HISTORY)
15 APR 1969

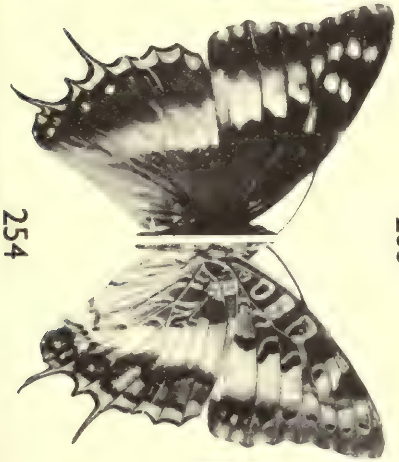

249

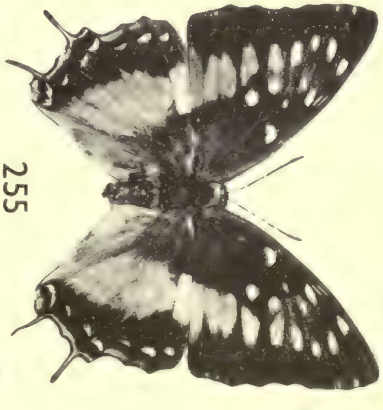

250

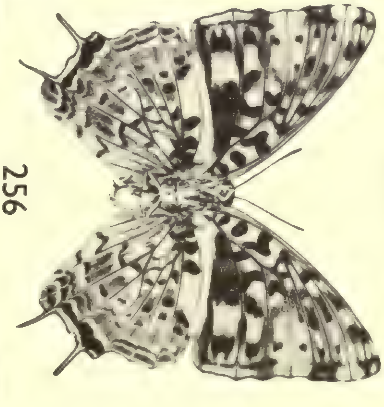

251

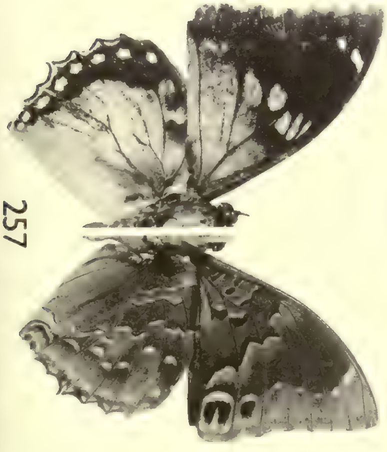

252


253


254


255


256


257

# A LIST OF SUPPLEMENTS TO THE ENTOMOLOGICAL SERIES OF THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

1. MASNER, L. The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Pp. 143. February, 1965. £5.
2. NIXON, G. E. J. A reclassification of the tribe Microgasterini (Hymenoptera: Braconidae). Pp. 284; 348 Text-figures. August, 1965. £6.
3. WATSON, A. A revision of the Ethiopian Drepanidae (Lepidoptera). Pp. 177; 18 plates, 270 Text-figures. August, 1965. £4 4*s*.
4. SANDS, W. A. A revision of the Termite Subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. Pp. 172; 500 Text-figures. October, 1965. £3 5*s*.
5. AHMAD, I. The Leptocorisinae (Heteroptera: Alydidae) of the World. Pp. 156; 475 Text-figures. November, 1965. £2 15*s*.
6. OKADA, T. Diptera from Nepal. Cryptochaetidae, Diastatidae & Drosophilidae. Pp. 129; 328 Text-figures. £3.
7. GILIOMEE, J. H. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera : Coccoidea). Pp. 168; 43 Text-figures. February, 1967. £3 3*s*.
8. FLETCHER, D. S. A revision of the Ethiopian species and a check list of the world species of *Cleora* (Lepidoptera: Geometridae). Pp. 119; 14 plates, 146 Text-figures, 9 maps. February, 1967. £3 10*s*.
9. HEMMING, A. F. The Generic Names of the Butterflies and their type-species (Lepidoptera : Rhopalocera). Pp. 509. August, 1967. £8 10*s*.
10. STEMPFFER, H. The Genera of the African Lycaenidae (Lepidoptera : Rhopalocera). Pp. 322; 233 Text-figures. Coloured frontispiece. September, 1967. £8.
11. MOUND, L. A. A review of R. S. Bagnall's Thysanoptera Collections. Pp. 184: 82 Text-figures. May, 1968. £4.
12. WATSON, A. The Taxonomy of the Drepaninae represented in China, with an Account of their World Distribution (Lepidoptera : Drepanidae). Pp. 151: 293 Text-figures, 14 plates. November, 1968. £5.

13. AFIFI, S. A. Morphology and Taxonomy of Adult Males of the families Pseudococcidae and Eriococcidae (Homoptera : Coccoidea). Pp. 210: 52 Text-figures. December, 1968. £5.

PRINTED IN GREAT BRITAIN BY ADLARD & SON LIMITED, BARTHOLOMEW PRESS, DORKING

# A REVISION OF THE AFRICAN SPECIES OF *PSEUDORHYNCHUS* SERVILLE (ORTHOPTERA : TETTIGONIIDAE)

BRITISH MU
15 APR 19
NATURAL HIST

D. R. RAGGE

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 5
LONDON : 1969

BRITISH MU
15 APR 19
NATURAL HIST

# A REVISION OF THE AFRICAN SPECIES OF *PSEUDORHYNCHUS* SERVILLE (ORTHOPTERA : TETTIGONIIDAE)

BY

DAVID ROBERT RAGGE

British Museum (Natural History)

*Pp.* 167–190; 38 *Text-figures*

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 5
LONDON : 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In* 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Vol.* 23, *No.* 5 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

*World List* abbreviation:
*Bull. Br. Mus. nat. Hist.* (Ent.)

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued* 11 *April* 1969 *Price Twelve Shillings*

# A REVISION OF THE AFRICAN SPECIES OF *PSEUDORHYNCHUS* SERVILLE (ORTHOPTERA : TETTIGONIIDAE)

*By* D. R. RAGGE

## CONTENTS

| | Page |
|---|---|
| SYNOPSIS | 169 |
| INTRODUCTION | 169 |
| ACKNOWLEDGMENTS | 170 |
| MATERIAL | 170 |
| *Pseudorhynchus* Serville | 170 |
| Key to the African species | 172 |
| Descriptions of the African species | 175 |
| REFERENCES | 190 |

## SYNOPSIS

The African species of *Pseudorhynchus* Serville are fully revised and an identification key is given. Two new species and two new subspecies are described and one specific synonym is newly established.

## INTRODUCTION

IN 1967 Professor D. F. Owen of Fourah Bay College (University of Sierra Leone) sent me a collection of Orthoptera from Freetown for identification. Two of the specimens belonged to an undescribed species of *Pseudorhynchus* Serville and, as Professor Owen was studying colour polymorphism in this species, he asked me to publish a name for it. Not wishing to describe a single species in isolation I undertook the present study, which embraces all the African species of the genus.

The genus *Pseudorhynchus* was erected by Serville in 1838 for the three species *Ps. sicarius* Serville (synonymized in the present paper with *Ps. lanceolatus* (Fabricius)), *Ps. flavescens* (Serville) and *Ps. lessonii* Serville. No type-species was fixed at that time, but the first of these three species was later designated as such by Kirby (1906 : 237), who included 15 species (five African) in the genus. The latest list of the species of *Pseudorhynchus* is that of Karny (1912 : 25), who included 14 species (five African) without qualification and a further five doubtful ones (one African). The genus has not been fully revised since the work of Redtenbacher (1891 : 364), though a key to the species was given by Karny (1907*a* : 17). The present revision includes all the African species referred without qualification to *Pseudorhynchus* by Karny (1912); five species (of which two are newly described) and four subspecies (two newly described and one reduced in status from a species) are recognized and one specific synonym newly established.

All the holotypes and lectotypes of the specific names covered by this revision still exist and have been examined. The author's usual conventions are observed (see Ragge, 1957 : 124) and the wing-vein nomenclature is that of Ragge (1955).

The technique used in the examination of the stridulatory organ is described on p. 172. The length of the fastigium of the vertex was measured from the basal tooth to the tip.

## ACKNOWLEDGMENTS

My sincere thanks are due to the following specialists, who have been kind enough to send me type-specimens or other material from their respective institutions:

Dr. P. Basilewsky, Dr. M. Beier, Dr. L. Chopard, Dr. M. Descamps, Dr. J. de A. Fernandes, Dr. Y. Gillon, Dr. K. K. Günther, Mr. A. U. Oboite, Dr. E. C. G. Pinhey, Dr. H. R. Roberts, Dr. C. H. Fraser Rowell, Dr. R. Roy, Dr. J. G. Rozen and the late Mr. V. van Straelen.

I am also most grateful to the following workers, who have very kindly sent me specimens collected by them personally:

Dr. and Mrs. R. W. Crosskey, Mr. R. A. Farrow, Miss J. M. McKay, Professor D. F. Owen and Mr. J. Phipps.

My thanks are due to Mr. W. J. Bailey, who kindly drew my attention to the replica technique for examining surface structure; this technique greatly facilitated the study of the stridulatory rib of the left male fore wing (see p. 172).

I should also like to thank Miss L. M. MacDonell for her assistance in measuring specimens and counting the hind tibial spines.

## MATERIAL

In addition to the collection of *Pseudorhynchus* in the British Museum (Natural History) (often abbreviated in this paper to BMNH), material was lent by the institutions listed below, through the courtesy of the specialists mentioned above (the abbreviations used where the material is listed in detail are inserted in parenthesis).

Musée Royal de l'Afrique Centrale, Tervuren (MRAC); Naturhistorisches Museum, Vienna (NM); Institut de Recherche Scientifique de Madagascar, Tananarive (IRSM); Muséum National d'Histoire Naturelle, Paris (MNHN); Museu e Laboratório Zoológico e Antropológico, Lisbon (MLZA); Office de la Recherche Scientifique et Technique Outre-Mer, Centre d'Adiopodoumé, Abidjan, Ivory Coast (ORSTOM); Zoologisches Museum of the Humboldt-Universität, Berlin (ZMHU); University of Ibadan, Nigeria (Univ. Ibadan); National Museum, Bulawayo, Rhodesia (NMR); American Museum of Natural History, New York (AMNH); Makerere University College, Kampala, Uganda (MUC); Institut Fondamental d'Afrique Noire, Dakar, Senegal (IFAN); Institut des Parcs Nationaux, Brussels (IPN).

## *PSEUDORHYNCHUS* Serville

*Pseudorhynchus* Serville, [1838] : 509. Type-species: *Pseudorhynchus sicarius* Serville (=*Ps. lanceolatus* (Fabricius)), by subsequent designation (Kirby, 1906 : 237).

Diagnosis. ♂♀. Fastigium of vertex separated from fastigium of frons, bearing ventral tooth or tubercle at base. Pronotum without lateral carinae. Prosternum with two well-developed spines. Meso- and metasternum with paired lobes, not produced into spines. Fore coxae with well-developed spine. Fore tibiae terete above, with slit-like tympanal opening on each side. Hind femora with ventral spines.

Discussion. The known African members of this Copiphorine genus are all easily recognized by their long, pointed " snout ", formed by the fastigium of the vertex. There are shorter snouts in the two African genera *Lanista* Bolívar and *Plastocorypha* Karsch, but in both these genera the fastigium of the vertex is contiguous with the fastigium of the frons.

The African species of *Pseudorhynchus* fall into two quite distinct groups: *Ps. lanceolatus* (Fabricius) and *Ps. pungens* (Schaum), in which the fastigium of the vertex is sharply pointed and the male cerci have an internal spine at the base; and *Ps. hastifer* (Schaum), *Ps. robustus* sp. n. and *Ps. crosskeyi* sp. n., in which the fastigium of the vertex is bluntly pointed and the male cerci have no basal spine. Each of these two types of male cercus is common in the Copiphorinae, but it is unusual for both to occur in the same genus. The two types of male cercus also occur in the Oriental species of *Pseudorhynchus*, but the correlation between this feature and the sharpness of the fastigium of the vertex does not hold for these species: the fastigium is short and blunt in some Oriental species in which the male cerci have a basal spine. A thorough study of all the species of *Pseudorhynchus* might well show that some of them would be better regarded as a distinct genus, but it is unlikely that such a decision would affect any of the species covered by the present revision.

One of the most interesting features of this genus in Africa is the colour variation, both within and between species. Like many Copiphorinae, all the species occur in two principal colour forms, one mainly green and the other mainly brown. (The three known specimens of *Ps. crosskeyi* sp. n. are all green, but it may be safely assumed that a brown form exists.) In addition to this general body colour there is often a pattern of dark pigmentation on the head, particularly on the frons and the underside of the fastigium of the vertex; leaving aside *Ps. crosskeyi* sp. n., of which insufficient material is available, the development of dark pigmentation takes a different form in each species, as outlined below.

> *Ps. lanceolatus* (Fabricius). The dark pigmentation always forms the same pattern and is independent of the green/brown polymorphism. There is little geographical variation.
>
> *Ps. pungens* (Schaum). The dark pigmentation is independent of the green/brown polymorphism, but shows marked geographical variation, forming quite different patterns in different parts of Africa.
>
> *Ps. robustus* sp. n. The dark pigmentation always forms the same pattern but is shown only by the brown colour variety. There is little geographical variation.
>
> *Ps. hastifer* (Schaum). None of the specimens examined of either the green or the brown colour forms had any dark pigmentation on the underside of the head.

Since the genitalia of *Ps. hastifer* (Schaum), *Ps. robustus* sp. n. and *Ps. crosskeyi* sp. n. do not show clear-cut differences, it was thought worth making a closer examination of the stridulatory organ and, in particular, the shape of the stridulatory rib of the left male fore wing and the number of teeth on it. To avoid the difficulties of examination with reflected light or the labour of making cleared preparations of the wing (both of which have severely limited the use of the microscopical structure of the stridulatory organ in Ensiferan taxonomy), a replica technique was used; this enabled the structure of the stridulatory rib to be examined without inconvenience and without removal of the fore wing from the specimen. The technique adopted is described below.

The left fore wing of each male specimen was relaxed locally by applying a small quantity of 10% ammonia solution to the wing-articulation with a hypodermic syringe or fine brush; any legs that would have obstructed the extension of the fore wing were relaxed at the base in the same way. As soon as it was relaxed (after no more than a few minutes) the fore wing was extended and, if necessary, the underside was allowed to dry. A small quantity of a strong solution of " Pyroxylin " (low viscosity nitrocellulose) in acetone was then applied to the underside of the cubito-anal area with a fine brush. After about two minutes the Pyroxylin replica, now dry, was peeled off the wing surface and placed between two microscope slides. If the replica was satisfactory the fore wing was returned to its flexed position on the insect, which thus resumed its previous appearance. This technique, which is essentially similar to the replica techniques described by several other authors (e.g. Sampson, 1961), has the advantages of being quick, leaving the specimen quite unharmed and being repeatable on the same specimen at any time. The resulting replicas are transparent and show the finest details of the surface structure of the wing; they can be easily examined using transmitted light and a number can be placed between each pair of slides for permanent storage. The self-adhesive binding strips used in making 7 × 7 cm. permanent mounts of photographic transparencies were found to provide a convenient way of binding the slides together.

Replicas of the stridulatory rib were taken in this way from all the male specimens available of all five species. They were used in preparing the diagrams of the stridulatory rib, in determining its length and in counting the number of stridulatory teeth; a number of tests failed to show any significant difference between the measurements taken from the replica and those taken from the actual wing. The small and sometimes rather irregular teeth that occur towards the end of the stridulatory rib in some of the specimens were included both in measuring the length of the rib and in counting the teeth. The results are given separately for each species and will be seen to show some well marked interspecific differences in spite of considerable intraspecific variation. The curvature of the stridulatory rib of *Ps. pungens* (Schaum) (Text-fig. 16) is characteristic, and the large number of stridulatory teeth in *Ps. crosskeyi* sp. n. marks it off well from *Ps. robustus* sp. n., which it resembles in many other respects.

Distribution. *Pseudorhynchus* is widespread in the Old World tropics, including most of the Oriental Region, Japan and Australia. Its range in Africa extends from near the northern limit of the grassland (at about latitude 15° N) to the eastern part of Cape Province in the south.

## KEY TO THE AFRICAN SPECIES

### MALES

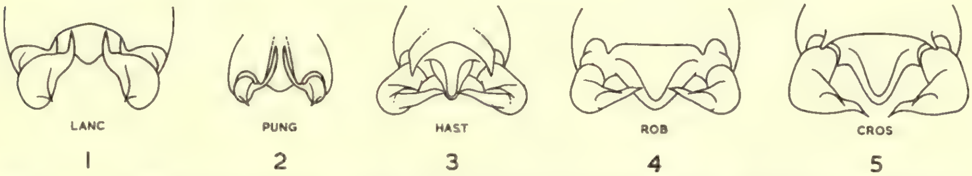
1 Cerci as in Text-figs. 1 or 2, with a basal, upwardly directed spine. Fastigium of the vertex sharply pointed (Text-figs 24–28) . . . . . . . . . . 2

– Cerci as in Text-figs. 3, 4 or 5, without a basal spine. Fastigium of the vertex bluntly pointed (Text-figs. 29–32) . . . . . . . . . . . . . . 3

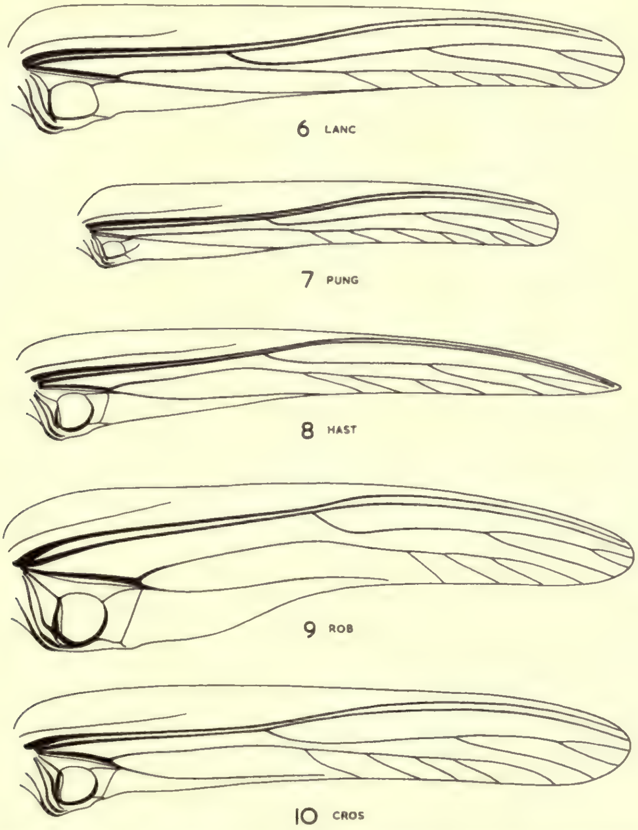
2 Cerci as in Text-fig. 1, with a short basal spine. Fore wings more than 42 mm. long **Ps. lanceolatus** (Fabricius) (p. 175)

– Cerci as in Text-fig. 2, with a long basal spine. Fore wings less than 41 mm. long **Ps. pungens** (Schaum) (p. 179)

3 Fore wings with a pointed tip, as in Text-fig. 8. Stridulatory region of the left fore wing as in Text-fig. 11, 1*A* as prominent as $Cu_2$ . **Ps. hastifer** (Schaum) (p. 186)



FIGS. 1–5. Posterodorsal view of the cerci and terminal abdominal tergites of the male of (1) *Pseudorhynchus lanceolatus* (Fabricius); (2) *Ps. pungens* (Schaum); (3) *Ps. hastifer* (Schaum); (4) *Ps. robustus* sp. n.; (5) *Ps. crosskeyi* sp. n.

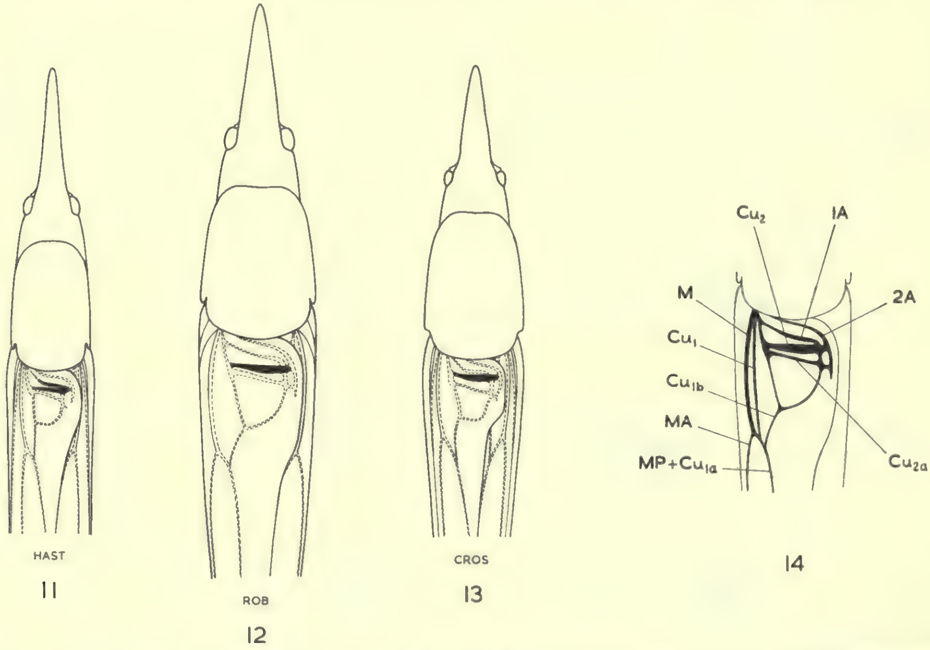


FIGS. 6–10. The right male fore wing of (6) *Pseudorhynchus lanceolatus* (Fabricius); (7) *Ps. pungens* (Schaum); (8) *Ps. hastifer* (Schaum); (9) *Ps. robustus* sp. n.; (10) *Ps. crosskeyi* sp. n.

– Fore wings with a rounded tip, not as in Text-fig. 8. Stridulatory region of the left fore wing as in Text-figs. 12 or 13, *1A* much less prominent than $Cu_2$ . . . 4

4 Stridulatory region of the left fore wing as in Text-fig. 12; *1A* well separated from $Cu_2$; cubito-anal area broadened. Stridulatory rib as in Text-fig. 18, with fewer than 80 stridulatory teeth. Hind tibiae with fewer than 15 external dorsal spines **Ps. robustus** sp. n. (p. 187)

– Stridulatory region of the left fore wing as in Text-fig. 13; *1A* contiguous for part of its length with $Cu_2$; cubito-anal area not broadened. Stridulatory rib as in Text-fig. 19, with more than 80 stridulatory teeth. Hind tibiae with more than 15 external dorsal spines . . . . . . **Ps. crosskeyi** sp. n. (p. 188)



FIGS. 11–14. The stridulatory organ of *Pseudorhynchus* Serville. 11–13. Dorsal view of the stridulatory organ of (11) *Ps. hastifer* (Schaum); (12) *Ps. robustus* sp. n.; (13) *Ps. crosskeyi* sp. n. 14. The venation of the stridulatory area of the left male fore wing of *Ps. robustus* sp. n.

### FEMALES

*Ps. crosskeyi* sp. n., in which the female sex is unknown, is omitted from this key.

1 Ovipositor less than 16 mm. long, shaped as in Text-fig. 21 . **Ps. pungens** (Schaum) (p. 179)

– Ovipositor more than 18 mm. long, shaped as in Text-figs. 20, 22 or 23 . . . 2

2 Fore wings with a pointed tip, as in Text-fig. 8 . . **Ps. hastifer** (Schaum) (p. 186)

– Fore wings with a rounded tip, not as in Text-fig. 8 . . . . . . . 3

3 Dark pigmentation of the underside of the head as in Text-fig. 24; fastigium of the vertex sharply pointed. Ovipositor relatively broad, as in Text-fig. 20. Hind tibiae usually with fewer than 7 external dorsal spines **Ps. lanceolatus** (Fabricius) (p. 175)

– Dark pigmentation of the underside of the head as in Text-fig. 31 or absent; fastigium of the vertex bluntly pointed. Ovipositor relatively slender, as in Text-fig. 23. Hind tibiae usually with more than 8 external dorsal spines **Ps. robustus** sp. n. (p. 187)

## DESCRIPTIONS OF THE AFRICAN SPECIES

### ***Pseudorhynchus lanceolatus*** (Fabricius)

(Text-figs. 1, 6, 15, 20, 24, 36)

*Locusta lanceolatus* Fabricius, 1775 : 284. Holotype ♀, Sierra Leone (BMNH) (see below) [examined].

*Pseudorhynchus sicarius* Serville, 1838 : 510. Lectotype ♀, locality unknown (MNHN, Paris) [examined]. **syn. n.**

*Pyrgocorypha hastata* Bolívar, 1890 : 222. Lectotype ♂, locality unknown (MLZA, Lisbon) [examined].

Diagnosis. ♂ ♀. Dark pigmentation of underside of head distributed as in Text-fig. 24; fastigium of vertex sharply pointed at tip. Venation and shape of right male fore wing as in Text-fig. 6; stridulatory rib of left male fore wing shaped as in Text-fig. 15, with about 76–100 teeth (mean of 24 examined: 89); female fore wings similar except for cubito-anal area. Male cerci as in Text-fig. 1, with basal, upwardly directed spine. Ovipositor rather broad, shaped as in Text-fig. 20.

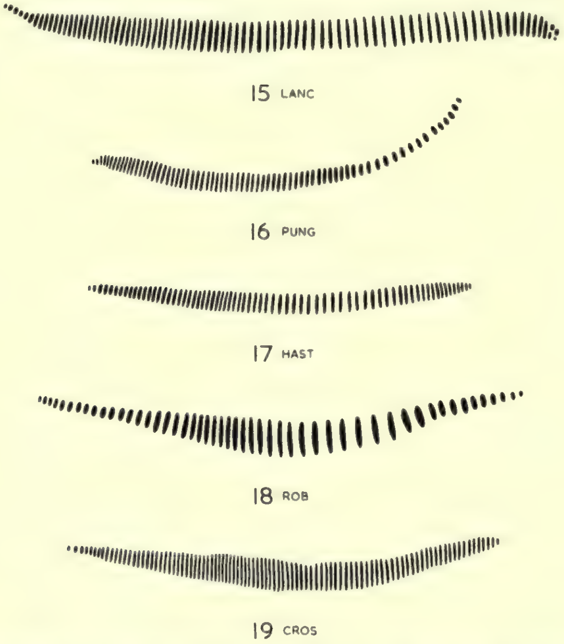
| Measurements | Males | Females |
|---|---|---|
| Total length | (36): 63·2–81·0, mean 72·00 | (42): 72·5–89·4, mean 79·12 |
| Length of fastigium of vertex | (42): 6·9–9·0, mean 8·18 | (46): 7·5–10·8, mean 8·74 |
| Median length of pronotum | (45): 9·2–11·8, mean 10·47 | (52): 10·0–12·1, mean 11·02 |
| Length of hind femur | (44): 18·0–23·6, mean 20·64 | (50): 20·1–25·7, mean 22·33 |
| Length of fore wing | (41): 43·1–55·0, mean 49·26 | (50): 49·3–62·1, mean 54·13 |
| Length of stridulatory rib | (24): 3·10–3·78, mean 3·45 | |
| Length of ovipositor | | (48): 20·6–27·6, mean 23·64 |

Discussion. This species, which is a common insect in West and Central Africa, may be easily recognized by the arrangement of the dark markings on the underside of the head together with the large size. The only other African species of *Pseudorhynchus* in which the head is sometimes similarly marked is *Ps. pungens* (Schaum), which is much smaller and has quite different male genitalia and ovipositor.

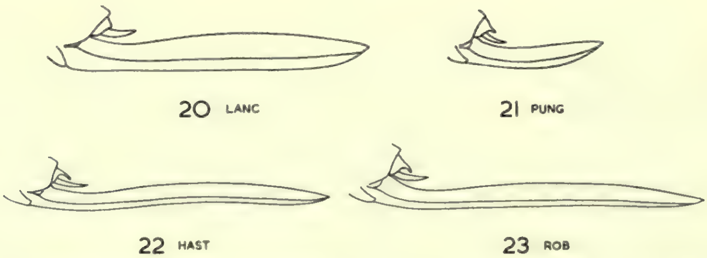
The brown colour variety has four dark stripes along the top of the head and pronotum, converging anteriorly and merging into two stripes at the level of the antennal sockets; there are also one or two dark stripes on each side of the head, extending posteriorly from the eyes and continuing along the lateral lobes of the pronotum. The fore wings have less clearly defined dark markings, also tending to form longitudinal stripes. Longitudinal striping of a similar nature is shown by the green variety, at least on the head and pronotum, but it is impossible to judge from dried material the extent to which the stripes are developed in this variety of the live insect.

The holotype of this species is in the Sir Joseph Banks Collection in the British Museum (Natural History). As stated by Zimsen (1964 : 618) there are two specimens in this collection above the label " *Locusta lanceolata* ": one is a female (labelled on the pin " Sierra Leone ") and is clearly Fabricius's type, and the other, a male (labelled on the pin " Siam "), belongs to the Oriental species *Ps. nobilis* (Walker). It is clear from Fabricius's statements " . . . fronte porrecta, lanceolata . . . ", " . . . frons inter oculos prominet, capite longior . . . " and " Habitat in Sierra Leon Africae ", all of which are applicable only to the female, that it was on this specimen alone that the name and description of " *Locusta lanceolata* " were based

*Ps. sicarius* Serville was described on the basis of two female specimens from unknown localities, one in the collection of " M. le compte Dejean " and the other in the Muséum National d'Histoire Naturelle, Paris. The former specimen is now lost, but there is no doubt from Serville's description that it belonged to *Ps. pungens* (Schaum). The specimen in the Paris museum, for which Serville gave a brief separate description, still exists and I have been able to examine it: it clearly belongs to *Ps. lanceolatus* (Fabricius). In order that the name *Ps. sicarius* should be based on an existing and accessible specimen, I here designate the specimen in the Paris museum as the LECTOTYPE of this species and I have so labelled it.

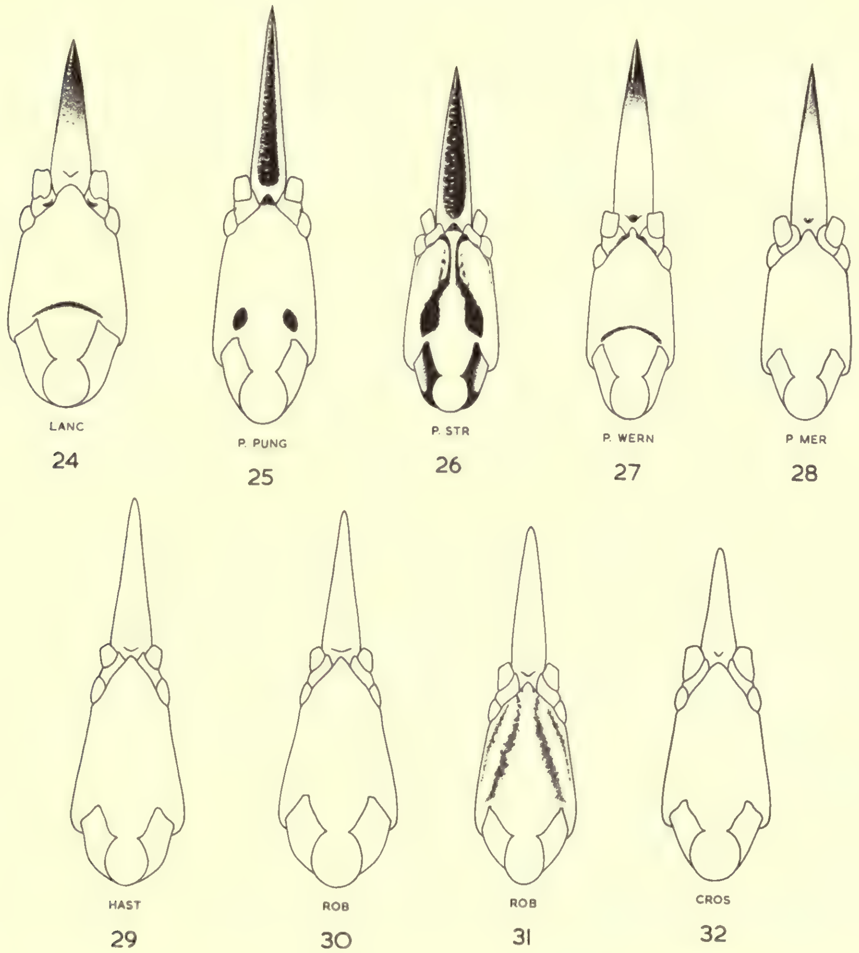


Figs. 15–19. Diagrams showing the shape of, and arrangement of teeth in, the stridulatory rib of (15) *Pseudorhynchus lanceolatus* (Fabricius); (16) *Ps. pungens* (Schaum); (17) *Ps. hastifer* (Schaum); (18) *Ps. robustus* sp. n.; (19) *Ps. crosskeyi* sp. n.



Figs. 20–23. Lateral view of the ovipositor of (20) *Pseudorhynchus lanceolatus* (Fabricius); (21) *Ps. pungens* (Schaum); (22) *Ps. hastifer* (Schaum); (23) *Ps. robustus* sp. n.

*Pyrgocorypha hastata* Bolívar was described from a single male and an unknown number of females in the Museu e Laboratório Zoológico e Antropológico, Lisbon; the type-locality is unknown. There are in that museum two males and three females (all without data) labelled, apparently in Bolívar's handwriting, as belonging to this species. The label bears an amendment, apparently in the same handwriting: "1 ♂ and 2 ♀♀" has been altered to "2 ♂♂ and 3 ♀♀" (information kindly supplied by Dr. J. de A. Fernandes). It would thus seem likely at first sight that a second specimen of each sex came to the attention of Bolívar after he had written his account of the species. However, Bolívar states in his description that the unique male



FIGS. 24–32. Ventral view of the head of (24) *Pseudorhynchus lanceolatus* (Fabricius); (25) *Ps. pungens pungens* (Schaum); (26) *Ps. p. striatus* ssp. n.; (27) *Ps. p. werneri* Karny; (28) *Ps. p. meridionalis* ssp. n.; (29) *Ps. hastifer* (Schaum); (30) *Ps. robustus* sp. n. (green form); (31) *Ps. robustus* sp. n. (brown form); (32) *Ps. crosskeyi* sp. n.

lacked the terminal segments of its abdomen (" El único ♂ que he visto carece de los anillos terminales del abdómen . . ."), and in both the existing males the abdomen is intact. Although it is possible that Bolívar was mistaken I have thought it unwise to regard either male specimen as a syntype, but it seems highly probable that at least two of the females are syntypes and I have selected and labelled one of them as a LECTOTYPE.

Material examined. Holotype. SIERRA LEONE, ♀ (BMNH).

GUINEA: Nimba, 1000 m, 1 ♀, 11.vi.1942 (*Lamotte*) (IFAN, Dakar); Nimba, 1640 m, 1 ♂, xii.1951 (*Lamotte & Roy*) (IFAN, Dakar); Nimba, Ziéla, 1 ♂, 30–31.iii.1957 (*Lamotte, Amiet & Vanderplaetsen*) (IFAN, Dakar); Nimba, Yalanzou, 1 ♂, 15.iii.1942 (*Lamotte*) (MNHN, Paris); Nimba, Nion, 1 ♀, ii–iv.1942 (*Lamotte*) (MNHN, Paris); Nimba, Keoulenta, 3 ♂, 1 ♀, ii–iv.1942 (*Lamotte*) (MNHN, Paris); Conakry, 1 ♂ (*Bertrand*) (MNHN, Paris); Serédou, 1 ♂, xii.1959 (*Pujol*) (MNHN, Paris); Toulaya, 1 ♂, 23.xii.1951 (MNHN, Paris); SIERRA LEONE: Njala, 1 ♀, xii.1931 (*Hargreaves*); Freetown, 4 ♂, 3 ♀, xii.1966 (*Owen*); IVORY COAST: Mt. Tonkoui, 1 ♂, 15.iii.1964 (*Gillon*) (ORSTOM, Abidjan); TOGO: Bismarckburg, 2 ♀, i–iv.1891 (*Büttner*) (ZMHU, Berlin); Misahöhe, 1 ♀, 12.v.1894 (*Baumann*) (ZMHU, Berlin); NIGERIA: Ibadan, 4 ♂, 5 ♀, xii-v.1960-67 (*Oboite*) (Univ. Ibadan); near Ibadan, Gombar, at light, 1 ♀, 11.i.1965 (*Gerard*); CAMEROUN: Batouri Distr., savanna, 2 ♀, i-ii.1936 (*Merfield*); Batouri Distr., 3° 45′ N, 13° 45′ E, 750 m, 1 ♀, v-vi.1935 (*Merfield*); Abong M'Bang Distr., 1 ♀, iv.1936 (*Merfield*); CONGO (BRAZZAVILLE): Mayomba, 1 ♀, 1899 (*Vergues*) (MNHN, Paris); Djoué distr., between Brazzaville and Reneville, 1 ♂, 1912 (*Bel*) (MNHN, Paris); 1 ♀, 1909 (*Lebaudy*) (MNHN, Paris); M'Bamou, near Brazzaville, 2 ♂, 1 ♀, 1903 (*Montezer*) (MNHN, Paris); CENTRAL AFRICAN REPUBLIC: Boukoko, 1 ♀, 1952 (MNHN, Paris); CONGO (KINSHASA): Kasai, Lomami, 1 ♂, 1928 (*Mayné*); Uelé, Gabu, 1 ♂, 14.xii.1932 (*Vrydagh*); Uelé, Ekibondo, between Niangara and Dungu, 2650 ft., 5 ♂, 3 ♀, 1.vii.1935 (*Vanderbilt Exp.*) (AMNH, New York); Luluabourg, 1 ♂, 1936 (*Puissant*); Mayidi, 1 ♂, 1942 (*Van Eyen*); Bas-Congo, 2 ♀, 1927 (*Sjören*); Camp de Lukula, 1 ♂, 1911 (*Daniel*); Ituri, Bunia, 1 ♂, iii.1939 (*Maristes*); Ituri, Faradje, 1 ♀, 22.i.1930 (*Collart*); Elisabetha, 1 ♀, 1921 (*Tinant*); Ubangi distr., 1 ♂, ix.1910 (*Schubotz*) (AMNH, New York); Garamba National Park, 7 ♂, 9 ♀, iii–xii.1950–51 (*De Saeger & Verschuren*) (IPN, Brussels, except for 2 ♂, 2 ♀ in BMNH); Upemba National Park, Lusinga, 1760 m, 1 ♀, 18.vii–8.viii.1947 (*de Witte*); Elizabethville, in open high grass country, 1 ♀ (AMNH, New York); BURUNDI: Muyeha, R. Kishubi, 1700 m, 1 ♀, 13.vii.1952 (*Laurent*); UGANDA: Entebbe, 1 ♂ (*Gowdey*); Entebbe, 1 ♀, 27.viii.1911 (*Gowdey*); Entebbe, 1 ♂, 1.vi.1913 (*Gowdey*); Mwera, 1 ♂, 2.viii.1913 (*Gowdey*); Mengo, 1 ♀ (*Millar*); Kampala, 1 ♀, 13 ix.1918; Kampala, 1 ♀, ii.1934 (Johnston); Kampala, 1 ♂, 1908 (*Bayon*); Kampala, 1 ♀, 7.vi.1942 (*Rehn*) (AMNH, New York); Budongo, 1 ♀ (*Gowdey*); Kabule, 1 ♀, 19.vi.1909; Toro, Nyakasura, 1 ♂, 18.iii.1932 (*Shillito*); Kakindu, 2 ♂, 1 ♀, 1910 (*Bayon*); Bussu, 1 ♀, 1909 (*Bayon*); Busu-Hill, Busoga, 1 ♂, 1 ♀ (*Carl*) (ZMHU, Berlin); Jinja, 2 ♀, iii–iv.1932 (*van Someren*); Tororo distr., Sukulu, 1 ♀, 13.i.1961 (*Burtt*); ETHIOPIA: 1 ♀, 1899 (*Michel*) (MNHN, Paris); TANZANIA: Mahari Peninsula, Kasoge, 2550 ft, 1 ♀, viii–ix.1959 (*2nd Oxford Univ. Exp.*); ANGOLA: Lunda, Dundo, 2 ♂, 2 ♀, ii–vii. 1949 (*Machado*).

In the British Museum (Natural History) unless otherwise stated.

Distribution. This species occurs commonly over a large part of West and Central Africa, extending from Guinea to Ethiopia and southwards into northern Angola. It is typically a species of high-grass savanna.

## ***Pseudorhynchus pungens*** (Schaum)

(Text-figs. 2, 7, 16, 21, 25–28, 34, 35)

*Conocephalus pungens* Schaum, 1853 : 778. Holotype ♀, MOZAMBIQUE (ZMHU, Berlin) [examined].

Diagnosis. ♂ ♀. Dark pigmentation of underside of head variable, but usually distributed as in Text-figs. 25–28; fastigium of vertex sharply pointed at tip. Venation and shape of right male fore wing as in Text-fig. 7; stridulatory rib of left male fore wing shaped as in Text-fig. 16, with about 50–87 teeth (mean of 16 examined: 66); female fore wings similar except for cubito-anal area. Male cerci as in Text-fig. 2, with basal, upwardly directed spine. Ovipositor relatively short, shaped as in Text-fig. 21.

MEASUREMENTS

| | Males | Females |
|---|---|---|
| Total length | (28): 41·6–62·8, mean 53·02 | (45): 50·4–71·9, mean 61·76 |
| Length of fastigium of vertex | (29): 5·5–9·4, mean 7·65 | (54): 6·0–10·9, mean 8·95 |
| Median length of pronotum | (29): 6·2–8·3, mean 7·31 | (56): 6·8–9·7, mean 8·36 |
| Length of hind femur | (29): 12·0–17·9, mean 15·14 | (51): 13·3–20·7, mean 17·44 |
| Length of fore wing | (30): 25·8–40·2, mean 34·30 | (52): 29·6–46·8, mean 39·82 |
| Length of stridulatory rib | (24): 1·58–2·47, mean 1·95 | |
| Length of ovipositor | | (49): 9·1–14·2, mean 11·49 |

Discussion. The small size of this species, together with the characteristic male cerci and short ovipositor, enable it to be readily distinguished from the other African species of *Pseudorhynchus*.

In addition to showing the usual green and brown colour varieties, which doubtless both occur throughout its range, *Ps. pungens* (Schaum) has the dark pigmentation on the underside of the head and the side of the mesothorax distributed in four distinct ways. As far as is known at present these colour forms, which appear to be independent of the green/brown polymorphism, are allopatric (see Text-fig. 33) and I have considered it convenient to treat them as subspecies. There are some associated slight differences in size and abdominal terminalia, and when more material becomes available one or more of these forms may prove to be distinct species, but the evidence available at present agrees well with the treatment given to these forms here. When considered as a whole they form a well defined unit clearly separated from the remaining species of the genus.

Distribution (Text-fig. 33). *Ps. pungens* (Schaum) probably occurs throughout the savannas and grasslands of tropical Africa and extends southwards, in the form of *Ps. p. meridionalis* ssp. n., into the coastal savanna of eastern South Africa.

### KEY TO THE SUBSPECIES

1 Dark pigmentation of the underside of the head as in Text-figs 27 or 28, the fastigium of the vertex darkening towards the tip . . . . . . . . . . 2

– Dark pigmentation of the underside of the head as in Text-figs 25 or 26, the fastigium of the vertex with a dark ventral stripe . . . . . . . . . . 3

2 Mesothorax with a conspicuous dark spot on each epimeron (Text-fig. 38). (South Africa) . . . . . . . ***Ps. pungens meridionalis*** ssp. n. (p. 185)

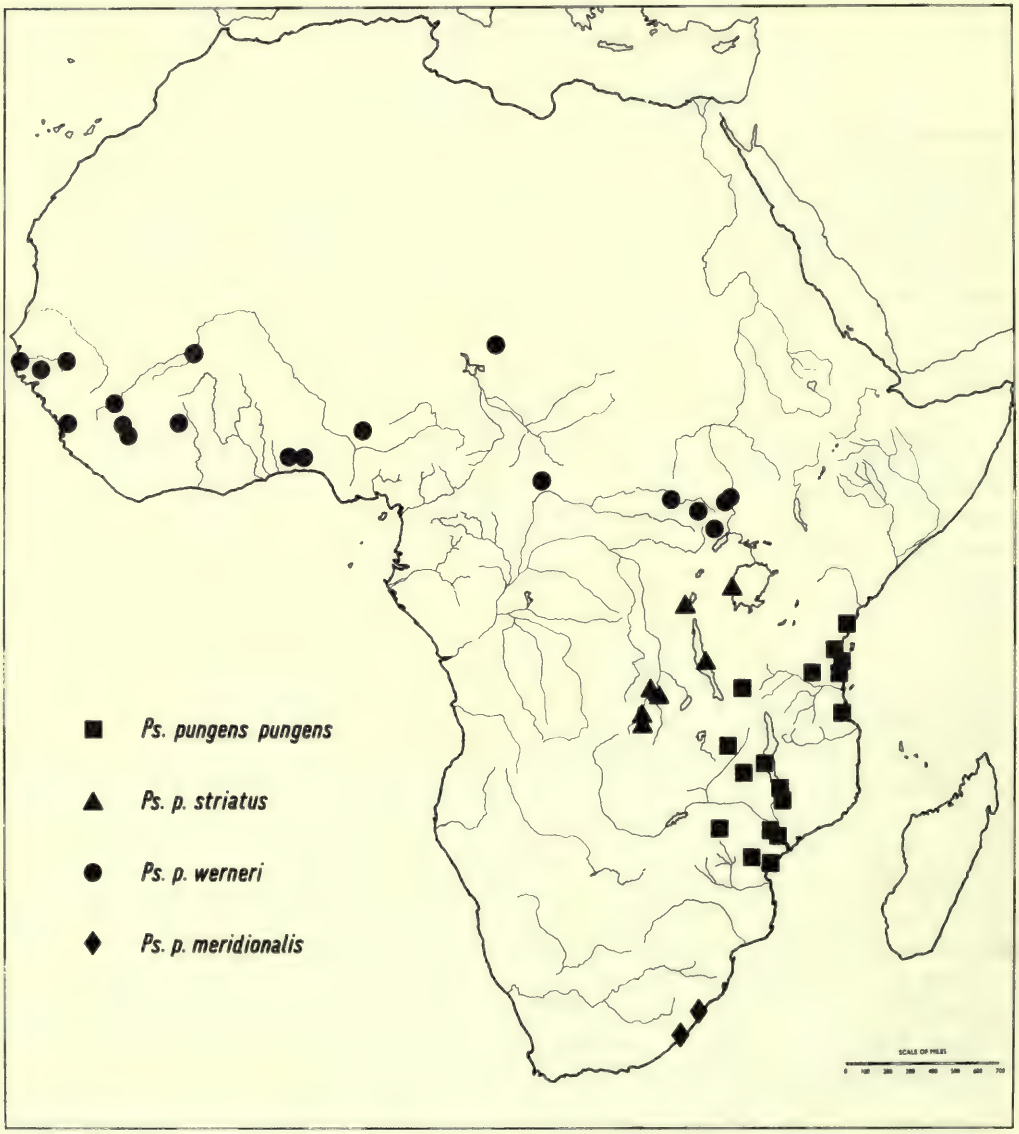

■ Ps. pungens pungens
▲ Ps. p. striatus
● Ps. p. werneri
◆ Ps. p. meridionalis
SCALE OF MILES
0
100
200
300
400
500
600
700

FIG. 33. Map showing the known distribution of the subspecies of *Pseudorhynchus pungens* (Schaum).

– Mesothorax without a dark spot on each epimeron. (West and Central Africa, north of the equator) . . . . . . **Ps. pungens werneri** Karny (p. 184)

3 Dark pigmentation of the frons as in Text-fig. 26, forming two longitudinal stripes, sometimes interrupted or restricted to the anterior end of the frons **Ps. pungens striatus** ssp. n. (p. 182)

– Dark pigmentation of the frons as in Text-fig. 25, forming two conspicuous dark spots near the mandibular articulations . . **Ps. pungens pungens** (Schaum) (p. 181)

## ***Pseudorhynchus pungens pungens*** (Schaum)

(Text-fig. 25)

*Conocephalus pungens* Schaum, 1853 : 778.

Diagnosis. ♂ ♀. Dark pigmentation of underside of head as in Text-fig. 25; fastigium of vertex with dark ventral stripe; frons without longitudinal stripes but with dark spot on fastigium and two dark spots near anterior mandibular articulations. Epimera of mesothorax often with rather inconspicuous dark spot (position as in Text-fig. 37). Stridulatory rib of left male fore wing with about 61–76 teeth (mean of 8 examined: 69).

MEASUREMENTS

| | Males | Females |
|---|---|---|
| Total length | (10): 52·9–62·8, mean 58·16 | (18): 59·6–71·9, mean 66·62 |
| Length of fastigium of vertex | (10): 7·5–9·3, mean 8·57 | (20): 8·3–10·9, mean 9·48 |
| Median length of pronotum | (10): 7·1–8·3, mean 7·79 | (21): 8·0–9·7, mean 8·87 |
| Length of hind femur | (9): 14·7–17·5, mean 16·28 | (18): 16·2–20·7, mean 18·62 |
| Length of fore wing | (10): 34·7–40·2, mean 37·86 | (20): 39·5–46·8, mean 43·24 |
| Length of stridulatory rib | (8): 1·97–2·24, mean 2·08 | |
| Length of ovipositor | | (17): 11·3–14·2, mean 12·74 |

Discussion. This subspecies may be recognized by the colour pattern on the underside of the head. All the males in the material examined had a dark spot of varying size and intensity on each mesothoracic epimeron (position shown in Text-fig. 37), but this feature was completely lacking in many of the females. As no two specimens of opposite sex had been collected in exactly the same locality, however, it cannot be established at present that the presence or absence of this spot is associated with sex in this subspecies. The spot is never as large or intense as in *Ps. p. meridionalis* ssp. n.

The known range of this subspecies comes nearest to that of *Ps. p. striatus* ssp. n. at Rukwa, from which a female was collected showing the dark band on the mandibles typical of that subspecies; however, this specimen has no dark stripes on the frons.

Material examined. Holotype. MOZAMBIQUE, ♀ (*Peters*) (ZMHU, Berlin).

KENYA: Rabai, 1 ♀, iv.1928 (*van Someren*); TANZANIA: Tanga Prov., Mlingano, 1 ♂, 4–12.iii.1950 (*Sweeney*); Tanga distr., 1 ♀, xii.1949 (*Phipps*); Mhindulo, 1 ♀, 8.xii.1926 (*Miller*); Kilosa, 2 ♂, xii.1925 (*Miller*); Tendaguru, 1 ♂, 14.xii.1924 (*Cutler*); Dar-es-Salaam, University College grounds, 1 ♀, 31.x.1964 (*Jago*); Sigi, Old Road, 1 ♀, 12.xi.1937 (*Burtt*); C. Rukwa, Kafukola, 1 ♀, 12.xii.1953 (*Robertson*); Zanzibar, 1 ♀; ZAMBIA: Fort Jameson, Chizongwe, 1 ♂, v.1966 (*Brock*); Mpika, 1 ♀, 29.vi.1954 (*FitzGerald*); Malawi: Fort Johnston, 1 ♂; Fort Johnston, 2 ♀ (*Rendall*); Zomba, 1 ♀ (*Lennon*); Kota Kota, 1 ♀; Rhodesia: Bindura, 1 ♀ (*Coghill*); Mozambique: Nova Chopanga, 1 ♀, xii.1928–i.1929 (*Surcouf*) (MNHN, Paris); Gorongoza Prov., Tendo du Sungoué, 40 m, 1 ♀ (*Vasse*) (MNHN, Paris); Vila Pery, 1 ♀, 1928 (*Lesne*) (MNHN, Paris); Beira, Zimbiti, 1 ♀, 27.iv.1908 (*Sheppard*); Caia, 3 ♂, vi.1927 (*Bushby*).

In the British Museum (Natural History) unless otherwise stated.

Distribution (Text-fig. 33). *Ps. p. pungens* (Schaum) no doubt occurs throughout a large part of the savanna of south-eastern Africa, extending northwards along the coastal belt into Kenya and southwards into Rhodesia and Mozambique. It is replaced to the west by *Ps. p. striatus* ssp. n., but the line along which the transition takes place cannot yet be accurately determined.

## *Pseudorhynchus pungens striatus* ssp. n.

(Text-figs. 26, 37)

Diagnosis. ♂ ♀. Dark pigmentation of underside of head as in Text-fig. 26; fastigium of vertex with dark ventral stripe; frons with darkened fastigium and with two longitudinal dark stripes, sometimes interrupted or restricted to anterior end of frons. Mandibles with exposed dark band next to clypeus or at least with dark mark in region of anterior articulation. Epimera of mesothorax with dark spot (Text-fig. 37), sometimes partially or completely covered by anterior margin of flexed fore wing. Stridulatory rib of left male fore wing with about 50–70 teeth (mean of 7 examined: 59).

MEASUREMENTS

| | Males | Females |
|---|---|---|
| Total length | (7): 41·6–54·9, mean 45·53 | (8): 50·4–59·1, mean 54·75 |
| Length of fastigium of vertex | (7): 5·5–7·2, mean 6·27 | (9): 6·0–8·6, mean 7·68 |
| Median length of pronotum | (6): 6·7–7·4, mean 6·90 | (9): 7·3–8·8, mean 8·10 |
| Length of hind femur | (7): 13·2–15·4, mean 13·83 | (8): 14·8–19·4, mean 16·71 |
| Length of fore wing | (7): 25·8–35·8, mean 28·81 | (9): 29·6–40·0, mean 35·39 |
| Length of stridulatory rib | (7): 1·58–1·97, mean 1·73 | |
| Length of ovipositor | | (9): 10·4–11·5, mean 10·86 |

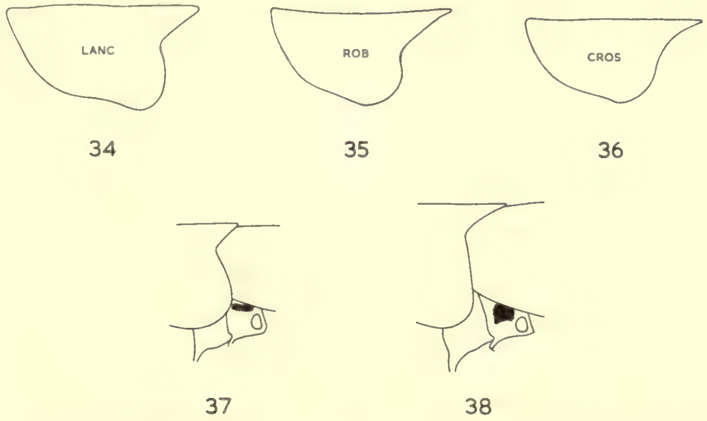
Discussion. This subspecies is characterized by the longitudinal dark stripes on the frons and the dark markings on the mandibles. The fullest development of this colour pattern is shown in Text-fig. 26, but the stripes are sometimes interrupted and occasionally restricted to the anterior end of the frons. Where the stripes are reduced in this way, dark spots always remain near the anterior mandibular articulations and the colour pattern approaches that of *Ps. p. pungens* (Schaum); however, all specimens showing any traces of dark stripes on the anterior part of the frons have been referred to the present subspecies. The two specimens showing the greatest reduction in the dark stripes were both females and were collected from Bukoba and the Mahari Peninsula in Tanzania; specimens with fully developed stripes were also collected at both these localities.

Material examined. Holotype. TANZANIA: Mahari Peninsula, Mugombazi Camp, by river, 2650 ft, ♂, 4.viii.1959 (*2nd Oxford Univ. Exp.*).

Paratypes. TANZANIA: Mahari Peninsula, Mugombazi Camp, by river, 2650 ft, 2 ♀, 4.viii.1959 (*2nd Oxford Univ. Exp.*); Mahari Peninsula, Lubugwe River, near Kasangazi, 4000 ft, leaf axil of wild banana, 1 ♂, 29.ix.1959 (*2nd Oxford Univ. Exp.*); Mahari Peninsula, Kasangazi, by river, 5500 ft, 1 ♀, 30.ix.1959 (*2nd Oxford Univ. Exp.*); Bukoba, 2 ♀, xii.1921 (*Miller*); CONGO (KINSHASA): Kivu, Bukavu, 1 ♀, 1.vi.1951 (*Bomans*) (MRAC, Tervuren); Katanga, Lubudi, 1 ♂, 1 ♀, vii–ix.1936 (*Prinz*) (MRAC, Tervuren); Katanga, Nyonga, 1 ♀, v.1925 (*de Witte*) (MRAC, Tervuren); Katanga, Kadia, 1 ♀, 4.iv.1925 (*de Witte*) (MRAC, Tervuren); Katanga, Kansenia, 1 ♂, 15.ix–15.x.1930 (*de Witte*) (MRAC, Tervuren); Upemba National Park, Pelenge Gorges, 1150 m, 8 ♂, 5 ♀, 6–20.vi.1947 (*de Witte*) (IPN, Brussels, except for 1 ♂, 1 ♀ in BMNH); Upemba National Park, Pelenge Gorges, 1150 m, 4 ♂, 3 ♀, 6–10.vi.1947 (IPN, Brussels, except for 1 ♂, 1 ♀ in BMNH); Upemba National Park, Pelenge Gorges, 1150 m, 3 ♀, 10–14.vi.1947 (*de Witte*) (IPN, Brussels); Upemba National Park, Pelenge Gorges, 1150 m, 1 ♂, 2 ♀, 18–20.vi.1947 (*de Witte*) (IPN, Brussels); Upemba National Park, Pelenge Gorges, 4 ♂, 1 ♀, 21–23.vi.1947 (*de Witte*) (IPN, Brussels); Upemba National Park, Pelenge Gorges, 2 ♀, 20–21.vi.1947 (*de Witte*) (IPN, Brussels); Upemba National Park, Kamitungulu, 1700 m, 1 ♂, 4.viii.1947 (*de Witte*); GABON: Ogoue, 1 ♀.

In the British Museum (Natural History) unless otherwise stated.

Distribution (Text-fig. 33). The available material suggests that the range of this subspecies extends from Gabon to western Tanzania over a large area of savanna to the south and east of the Congo Forest. It is replaced in south-eastern Africa by *Ps. p. pungens* (Schaum).



FIGS. 34–38. *Pseudorhynchus* Serville. 34–36. Lateral view of the pronotum of (34) *Ps. lanceolatus* (Fabricius); (35) *Ps. robustus* sp. n.; (36) *Ps. crosskeyi* sp. n. 37–38. Lateral view of part of the thorax of (37) *Ps. pungens striatus* ssp. n. and (38) *Ps. p. meridionalis* ssp. n., showing the position of the mesepimeral spot.

### ***Pseudorhynchus pungens werneri*** Karny **stat. n.**

(Text-fig. 27)

*Pseudorhynchus Werneri* Karny, 1907*a* : 279. Lectotype ♂, SUDAN: Gondokoro (NM, Vienna) [examined].

Diagnosis. ♂ ♀. Dark pigmentation of underside of head as in Text-fig. 27; underside of fastigium of vertex darkening towards tip and with darkened basal tooth; frons usually with dark markings near fastigium and with dark band, occasionally interrupted in middle, along frontoclypeal suture; fastigium of frons not or hardly darkened; antennal scrobes with dark markings. Mesothoracic epimera without dark spot. Stridulatory rib of left male fore wing with about 61–71 teeth (mean of 6 examined: 67).

MEASUREMENTS

| | Males | Females |
|---|---|---|
| Total length | (8): 45·8–57·2, mean 51·55 | (15): 53·4–64·9, mean 60·75 |
| Length of fastigium of vertex | (10): 5·8–9·4, mean 7·54 | (20): 7·0–10·5, mean 9·17 |
| Median length of pronotum | (10): 6·2–7·5, mean 6·87 | (21): 6·8–8·6, mean 7·93 |
| Length of hind femur | (10): 12·0–16·0, mean 14·34 | (20): 13·3–17·7, mean 16·41 |
| Length of fore wing | (10): 30·1–37·2, mean 33·63 | (19): 35·3–42·7, mean 38·92 |
| Length of stridulatory rib | (6): 1·69–1·93, mean 1·84 | |
| Length of ovipositor | | (18): 9·1–11·2, mean 10·66 |

Discussion. The colour pattern on the underside of the head of this subspecies is characteristic. Specimens in which the dark pigmentation is least developed, with the frontoclypeal band interrupted in the middle, approach *Ps. p. meridionalis* ssp. n. in the colouring of the head, but may be readily distinguished from it by the complete absence of the dark spot on the mesothoracic epimera.

The name of this subspecies (with the rank of species) was published twice by Karny in 1907, once (Karny, 1907*a* : 279) in the *Sber. Akad. Wiss. Wien* and once (Karny, 1907*b* : 18) in the *Verh. zool.-bot. Ges. Wien.* The former publication appeared much earlier in the year than the latter, however, and must therefore be taken to contain the original description of the subspecies. Karny (1907*b*) states that the type-locality, Gondokoro, is in Uganda, but it is in fact in southern Sudan, very near to Juba. The number of syntypes of this subspecies was not stated by Karny (1907*a*, *b*), but the ranges of measurements given (Karny, 1907*a* : 280) make it clear that there must have been at least two specimens of each sex. One female syntype is in the British Museum (Natural History) and I have examined two further syntypes, one of each sex, from the Naturhistorisches Museum, Vienna; it is possible that there are further syntypes in other museums. From the three syntypes that I have examined I have selected and labelled the male as a LECTOTYPE.

Material examined. Lectotype. SUDAN: Gondokoro, ♂, iii.1905 (*Werner*) (NM, Vienna).

Paralectotypes. SUDAN: Gondokoro, 1 ♀, 10.iii.1905 (*Werner*); Gondokoro, 1 ♀, 14.iii.1905 (*Werner*) (NM, Vienna).

GAMBIA: 1 ♀ (*Dudgeon*); SENEGAL: Niokola-Koba National Park, Badi, at light, 2 ♂, 23.xi.1959 (IFAN, Dakar); Niokola-Koba National Park, Badi, 1 ♂, 1 ♀, 23–25.vi.1967 (IFAN, Dakar); Niokola-Koba National Park, Badi, 1 ♀, iii–iv.1967 (IFAN, Dakar); Casamance, Kolda, 3 ♂, 1 ♀, 4–24.xi.1963 (*Gaillard*) (IFAN, Dakar); GUINEA: Forécariah, 1 ♀ (*Mrázek*); Beyla, 1 ♂ (*Mrázek*); Kouroussa distr., 1 ♀, 1904 (*Pobéguin*) (MNHN, Paris); Kérouané, 1 ♀, xii.1920 (*Chabanaud*) (MNHN, Paris); MALI: Macina, Dari, 1 ♂, 28.xi.1963 (*Farrow*); IVORY COAST: Ferkéssédougou, 1 ♀ (ORSTOM, Abidjan); DAHOMEY: Zagnanado, 1 ♀, 8–14.v.1950 (*Villiers*) (IFAN, Dakar); NIGERIA: Ibadan, at light, 1 ♀, 4.xii.1964 (*Oboite*) (Univ. Ibadan); Ibadan, 1 ♂, 1 ♀, xi.1956 (*Ene*); Niger Province, Abuja, 1 ♀, vi.1955 (*Crosskey*); CHAD: Kanem, 1 ♀, 1904 (*Dupertuis*) (MNHN, Paris); CENTRAL AFRICAN REPUBLIC: Fort Sibut, 1375 ft, 1 ♀, 17.x.1934 (*Rehn*) (AMNH, New York); CONGO (BRAZZAVILLE): Grande Forêt de Mayombé, 1 ♀, 1937 (*de le Rue*) (MNHN, Paris); CONGO (KINSHASA): Uele, Doruma, 1 ♀, 1937 (*De Graer*) (MRAC, Tervuren); Ituri, Aru, 1 ♀, 1938 (*Bastiaens*) (MRAC, Tervuren); Garamba National Park, 1 ♀, xi.1949 (*De Saeger*); SUDAN: Lado Enclave, Rejaf, 1 ♀ (*Lankester*) (AMNH, New York); Juba (caught at Khartoum on aircraft from Juba), 1 ♀, 3.xi.1936.

In the British Museum (Natural History) unless otherwise stated.

Distribution (Text-fig. 33). This subspecies no doubt occurs throughout the belt of savanna and grassland extending across West and Central Africa, north of the forest, as far as southern Sudan. It is replaced south of the equator by *Ps. p. striatus* ssp. n.

### *Pseudorhynchus pungens meridionalis* ssp. n.

(Text-figs. 28, 38)

Diagnosis. ♂ ♀. Dark pigmentation of underside of head as in Text-fig. 28; underside of fastigium of vertex darkening towards tip and with darkened basal tooth; frons unmarked or with small dark mark on each side of frontoclypeal suture; fastigium of frons with slightly darkened tip. Mesothoracic epimera with large and conspicuous black spot (Text-fig. 38). Stridulatory rib of left male fore wing with about 77–87 teeth (mean of 3 examined: 69).

MEASUREMENTS

| | Males | Females |
|---|---|---|
| Total length | (3): 55·0–60·8, mean 57·33 | (2): 61·5–65·9, mean 63·70 |
| Length of fastigium of vertex | (2): 8·1–8·8, mean 8·45 | (3): 8·0–9·9, mean 8·77 |
| Median length of pronotum | (3): 7·9–8·3, mean 8·03 | (3): 8·7–8·9, mean 8·80 |
| Length of hind femur | (3): 17·0–17·9, mean 17·47 | (3): 18·6–20·0, mean 19·47 |
| Length of fore wing | (3): 35·8–39·6, mean 37·50 | (2): 41·8–42·3, mean 42·05 |
| Length of stridulatory rib | (3): 2·26–2·47, mean 2·35 | |
| Length of ovipositor | | (3): 10·9–11·7, mean 11·40 |

Discussion. The large black spot on the side of the mesothorax and the lack of conspicuous dark pigmentation on the frons enable this subspecies to be easily recognized.

Material examined. Holotype. SOUTH AFRICA: Natal, Durban, ♂, 12.iv.1909 (*Leigh*) (AMNH, New York).

Paratypes. SOUTH AFRICA: Natal, Durban, 1 ♂, 30.iii.1909 (*Leigh*); Natal, Durban, 1 ♀, 3.iv.1909 (*Leigh*) (AMNH, New York); Pondoland, Port St. John, 1 ♂, 1–15.iv.1924 (*Turner*); Pondoland, Port St. John, 1 ♀, 5–30.iv.1923 (*Turner*); Pondoland, Port St. John, 1 ♀, v.1924 (*Turner*).

In the British Museum (Natural History) unless otherwise stated.

Distribution (Text-fig. 33). This subspecies probably occurs along most of the coastal savanna of south-eastern Africa. At what point it is replaced to the north by *Ps. p. pungens* (Schaum) and the extent to which it occurs inland cannot be determined until further material is available.

## ***Pseudorhynchus hastifer*** (Schaum)

(Text-figs. 3, 8, 11, 17, 22, 29)

***Conocephalos*** [*sic*] ***hastifer*** Schaum, 1853 : 778. Holotype ♀, MOZAMBIQUE (ZMHU, Berlin) [examined].

Diagnosis. ♂ ♀. Underside of head without dark pigmentation; fastigium of vertex bluntly (rarely sharply) pointed at tip. Fore wings pointed at tip, venation and shape of right male fore wing as in Text-fig. 8 (female fore wings similar except for cubito-anal area); stridulatory region of left male fore wing as in Text-fig. 11, *1A* strongly developed and contiguous for part of its length with $Cu_2$, stridulatory rib shaped as in Text-fig. 17, with about 57–74 teeth (mean of 5 examined: 66). Male cerci as in Text-fig. 3, with two inwardly directed spines at tip. Ovipositor relatively long and narrow, shaped as in Text-fig. 22.

MEASUREMENTS

| | Males | Females |
|---|---|---|
| Total length | (3): 59·7–67·0, mean 63·80 | (12): 63·8–90·3, mean 77·96 |
| Length of fastigium of vertex | (5): 6·5–10·8, mean 8·26 | (17): 7·0–12·2, mean 9·04 |
| Median length of pronotum | (4): 9·3–12·0, mean 10·10 | (18): 7·5–11·4, mean 9·44 |
| Length of hind femur | (5): 21·0–28·4, mean 23·50 | (17): 20·8–27·6, mean 24·25 |
| Length of fore wing | (5): 47·3–60·0, mean 52·04 | (14): 44·6–63·3, mean 55·06 |
| Length of stridulatory rib | (5): 1·82–2·44, mean 2·16 | |
| Length of ovipositor | | (16): 23·9–28·9, mean 26·44 |

Discussion. This species may be recognized at a glance by its pointed wing-tips, which are unique in the genus. In none of the specimens examined was there any dark pigmentation on the underside of the head, in either the green or the brown colour varieties.

Material examined. Holotype. MOZAMBIQUE: ♀ (*Peters*) (ZMHU, Berlin).

CAMEROUN: Serbewel, 1 ♀, 25.v.1935 (MNHN, Paris); CONGO (BRAZZAVILLE): Loukouléla, 1 ♀ (MNHN, Paris); SUDAN: "S. Sudan", 2 ♀, ix.1917 (Yardley) (AMNH, New York); Sobat R., 1 ♀, 1.ii.1914 (*Lowe*) (BMNH); CONGO (KINSHASA): Flandria, 1 ♀, iii.1931 (*Hulstaert*) (MRAC, Tervuren); Kashobwe, Luapula, 1 ♂, 6.i.1938 (*Bredo*) (MRAC, Tervuren); Kasai, Ipamu, 1 ♀, 1922 (*Vanderijst*) (MRAC, Tervuren); Katanga, Nyonga, 1 ♀, v.1925 (*de Witte*) (MRAC, Tervuren); TANZANIA: Tendaguru, 1 ♀ (*Janensch*) (ZMHU, Berlin); ANGOLA: Lac Colundo, 1 ♀, i.1955 (*Machado*) (BMNH); RHODESIA: Turk Mine, 1 ♀, xi.1957 (NM, Bulawayo); MOZAMBIQUE: Zambezi, Nova Choupanga, near Chemba, 1 ♀, v.1928 (*Lesne*) (MNHN, Paris); Beira, 1 ♀, ix.1928 (*Lesne*) (MNHN, Paris); Beira, 1 ♂, 1 ♀, 11–13.vi.1955 (*Brown*) (BMNH); SOUTH AFRICA: Transvaal, Loskop, 1 ♂, xii.1959 (*van Son*) (BMNH);

MADAGASCAR: south, Tulear, 1 ♂, 1957 (*Gruvel*) (IRSM, Tananarive); south-west, Banian, Ankazoabo, 2 ♀, vii.1957 (*Andria*) (IRSM, Tananarive).

Distribution. *Ps. hastifer* (Schaum) appears to be widespread in the savannas and grasslands of central, eastern and south-eastern Africa, and occurs at least as far west as Lake Chad. It is the only species of the genus known at present from Madagascar.

## ***Pseudorhynchus robustus*** **sp. n.**

(Text-figs. 4, 9, 12, 18, 23, 31, 35)

Diagnosis. ♂ ♀. Underside of head of green variety without dark pigmentation; that of brown variety with frons striped as in Text-fig. 31; fastigium of vertex bluntly pointed and often darkened on underside in brown variety. Venation and shape of right male fore wing as in Text-fig. 9; stridulatory region of left male fore wing as in Text-fig. 12, $1A$ not prominent and well separated from $Cu_2$, stridulatory rib shaped as in Text-fig. 18, with about 46–69 teeth (mean of 13 examined: 53); female fore wings similar except for cubito-anal area. Male cerci as in Text-fig. 4, with two inwardly directed spines at tip. Ovipositor relatively long, shaped as in Text-fig. 23.

Description. ♂. Fastigium of vertex bluntly pointed, as in Text-figs. 30 and 31.

Lateral lobes of pronotum shaped as in Text-fig. 35. Fore femora usually with 1–3 internal ventral spines. Fore tibiae with about 4–7 external (and similar number of internal) ventral spurs. Mid femora with about 2–4 external ventral spines. Mid tibiae with about 6–7 external (and similar number of internal) ventral spurs. Hind femora with about 5–9 internal and 6–12 external ventral spines. Hind tibiae with about 12–16 internal and 7–14 external dorsal spines. Fore wings broadened towards base; shape and venation of right fore wing as in Text-fig. 9. Stridulatory region of left fore wing as in Text-fig. 12; $1A$ not prominent and well separated for most of its length from $Cu_2$; stridulatory rib shaped as in Text-fig. 18, with about 46–69 teeth (mean of 13 examined: 53).

Tenth abdominal tergite and supra-anal plate shaped as in Text-fig. 4. Cerci as in Text-fig. 4, with two inwardly directed spines at tip.

General coloration green or brown, with labrum and exposed part of mandibles usually reddish. Brown form with dark longitudinal stripes on head (especially frons—see Text-fig. 31) and pronotum, and dark spots on legs and often fore wings.

♀. As male except for fore wings and genitalia. Tenth abdominal tergite produced posteriorly into two acute lobes. Ovipositor relatively long, shaped as in Text-fig. 23. Subgenital plate truncate or slightly emarginate at tip.

MEASUREMENTS

| | Males | Females |
|---|---|---|
| Total length | (14): 48·9–79·3, mean 67·71 | (12): 58·9–78·5, mean 72·37 |
| Length of fastigium of vertex | (15): 4·7–7·5, mean 6·96 | (14): 5·8–8·3, mean 7·51 |
| Median length of pronotum | (17): 7·3–11·5, mean 10·38 | (14): 7·4–10·2, mean 9·16 |
| Length of hind femur | (16): 15·8–28·8, mean 25·00 | (13): 19·8–27·4, mean 24·88 |
| Length of fore wing | (16): 34·6–54·1, mean 50·04 | (13): 41·7–56·8, mean 51·85 |
| Length of stridulatory rib | (13): 2·34–2·89, mean 2·73 | |
| Length of ovipositor | | (15): 22·5–29·0, mean 26·99 |

Variation. The armature of the legs is variable, the fore femora occasionally being quite unarmed. The number of stridulatory teeth varies and is not proportional to the length of the stridulatory rib. The brown colour variety varies considerably in the extent and intensity of the dark markings. There is much variation in size, the smallest specimens in the material examined coming from Lusinga in the Upemba National Park, Congo (Kinshasa).

Discussion. This species resembles *Ps. hastifer* (Schaum) and *Ps. crosskeyi* sp. n. in the genitalia and the blunt fastigium of the vertex, but may be readily distinguished from the former by the rounded wing-tips and from the latter by the longer fastigium of the vertex and the shape and structure of the stridulatory organ.

*Ps. robustus* sp. n. is of particular interest among the African species of *Pseudorhynchus* in that the dark pigmentation on the underside of the head is markedly affected by the green/brown polymorphism: the brown variety has characteristic dark stripes on the frons (Text-fig. 31) while the green variety has no dark pigmentation on the underside of the head (except, occasionally, for some darkening of the underside of the fastigium of the vertex).

Material examined. Holotype. SIERRA LEONE: Freetown, ♂, x.1967 (*Owen*).

Paratypes. SIERRA LEONE: Freetown, 1 ♂, 1 ♀, x.1967 (*Owen*); Freetown, Botanic Garden, 1 ♀, 24.x.1967 (*Owen*); Freetown, Mt. Aureol, 1000 ft, 1 ♀, x.1957 (*Phipps*); Njala, 1 ♂, 17.viii.1922 (*Hargreaves*); Gbangbama, 1 ♂, 10.x.1912 (*Simpson*); Loma Mtns., near Serelenkonko, 600 m, 1 ♀ (nymph), 22.ix.1964 (IFAN, Dakar); NIGERIA: Ibadan, 1 ♀, 2.ii.1967 (*Oboite*) (Univ. Ibadan); Ibadan, 1 ♂, 1 ♀, 8.ix.1964 (*Oboite*) (♂ in Univ. Ibadan, ♀ in BMNH); Ibadan, 1 ♀, 3.xii.1962 (*Oboite*); CONGO (KINSHASA): Kibale-Ituri Distr., Vube, 5 miles N. of Nepoko R. ferry, Avakubi-Niangara Rd., 1 ♂, 19.ix.1934 (*Rehn*) (AMNH, New York); Kibali-Ituri, Kilo, 1 ♂, xii.1933 (*du Soleil*) (MRAC, Tervuren); Kibali-Ituri, Kilo, 1 ♂, xii.1931 (*du Soleil*) (MRAC, Tervuren); Kibali-Ituri, Kilo, 1 ♀, x.1931 (*du Soleil*) (MRAC, Tervuren); Kilo, 1 ♂, xii.1934 (*du Soleil*) (MRAC, Tervuren); Bas Congo, Mangembo, 1 ♂, 1932 (*Zwolakowski*) (MRAC, Tervuren); Mayumbe, Luki, 1 ♂ (*Jieters*) (MRAC, Tervuren); Isangi, 1 ♂, 1929 (*Walkiers*) (MRAC, Tervuren); Kivu, Kadjudju, 1 ♂, 1 ♀, 1932 (*Babault*) (MNHN, Paris); Upemba National Park, Lusinga, 1760 m, 1 ♂, 29.iii.1947 (*de Witte*) (IPN, Brussels); Upemba National Park, Lusinga, 1760 m, 1 ♀, 22–23.iv.1949 (*de Witte*) (IPN, Brussels); Upemba National Park, Pelenge Gorges, 1150 m, 1 ♀, 21–23.vi.1947 (*de Witte*) (IPN, Brussels); Upemba National Park, Pelenge Gorges, 1150 m, 2 ♀, 6–20.vi.1947 (*de Witte*) (IPN, Brussels); UGANDA: Kampala, 1 ♂, 1.ix.1915 (*Gowdey*); Kampala, 12.ix.1918; Kampala, Makerere Hill, 1 ♀, iv.1968 (*McKay*) (MUC, Kampala).

In the British Museum (Natural History) unless otherwise stated.

Distribution. The available material comes from rather scattered localities but suggests that *Ps. robustus* sp. n. occurs widely in the moist savannas of West and Central Africa, extending from Sierra Leone to Lake Victoria and southwards as far as Katanga.

### ***Pseudorhynchus crosskeyi* sp. n.**

(Text-figs. 5, 10, 13, 19, 32, 36)

Diagnosis. ♂. Fastigium of vertex bluntly pointed and relatively short (Text-fig. 32), its ratio to median length of pronotum less than 0·6. Lateral pronotal lobes shaped as in Text-fig. 36, humeral angle not or hardly evident. Venation and shape of right fore wing as in Text-fig.

10; stridulatory region of left fore wing as in Text-fig. 13, 1*A* not prominent and contiguous for part of its length with $Cu_2$, stridulatory rib shaped as in Text-fig. 19, with about 93–103 teeth (mean of 3 examined: 96). Cerci as in Text-fig. 5, with two inwardly directed spines at tip.

♀ unknown.

Description. ♂. Fastigium of vertex bluntly pointed, as in Text-fig. 32.

Lateral pronotal lobes shaped as in Text-fig. 36, humeral angle not or hardly evident. Fore femora with about 2–4 internal ventral spines. Fore tibiae with about 6–8 external (and similar number of internal) ventral spurs. Mid femora with about 3–5 internal ventral spines. Mid tibiae with about 7–9 external (and similar number of internal) ventral spurs. Hind femora with about 8–12 internal and 11–14 external ventral spines. Hind tibiae with about 17–24 external (and similar number of internal) dorsal spines. Venation and shape of right fore wing as in Text-fig. 10. Stridulatory region of left fore wing as in Text-fig. 13; 1*A* not prominent and contiguous for part of its length with $Cu_2$; stridulatory rib shaped as in Text-fig. 19, with about 93–103 teeth (mean of 3 examined: 96).

Tenth abdominal tergite and supra-anal plate shaped as in Text-fig. 5. Cerci as in Text-fig. 5, with two inwardly directed spines at tip.

General coloration green, with labrum and exposed part of mandibles reddish. [Brown variety no doubt also exists.]

♀ unknown.

MEASUREMENTS

| | Males |
|---|---|
| Total length | (3): 67·7–79·8, mean 72·03 |
| Length of fastigium of vertex | (3): 4·2–5·8, mean 5·03 |
| Median length of pronotum | (3): 9·4–10·5, mean 9·90 |
| Length of hind femur | (3): 22·0–25·2, mean 23·67 |
| Length of fore wing | (3): 42·5–47·4, mean 44·90 |
| Length of stridulatory rib | (3): 2·42–2·76, mean 2·56 |

Variation. The armature of the legs is variable. The number of external dorsal spines of the hind tibiae is larger in the three specimens available than in any of the other African species of the genus, but the variability of the number of these spines in *Ps. crosskeyi* sp. n. cannot be assessed from these three specimens from the same locality.

No doubt a brown variety exists, but all three available specimens are almost uniformly green.

Discussion. *Ps. crosskeyi* sp. n. is one of the three known blunt-snouted African species of the genus; within this group it may be distinguished from *Ps. hastifer* (Schaum) by its rounded wing-tips and from *Ps. robustus* sp. n. by the shorter fastigium of the vertex, the shape and structure of the stridulatory organ (especially the large number of stridulatory teeth) and the more numerous dorsal spines on the hind tibiae.

It is unfortunate that the only three available specimens of this species should be of the same sex and colour variety and from the same locality. It is almost certain that a brown variety exists and it would be most interesting to know what kind of distribution of dark pigment it shows.

Material examined. Holotype. NIGERIA: Niger Province, Diko, in house, ♂, 1.ii.1958 (*Crosskey*).

Paratypes. NIGERIA: Niger Province, Diko, in house, 1 ♂, 1.ii.1958 (*Crosskey*); Niger Province, Diko, in house, 1♂, 2.xi.1958 (*Crosskey*).

All in the British Museum (Natural History).

Distribution. Known only from the type-locality.

## REFERENCES

BOLÍVAR, I. 1890. Ortópteros de Africa del Museo de Lisboa (conclusion). *Jorn. Sci. math. phys. nat.* (2) **1** : 211–232, 1 pl.

FABRICIUS, J. C. 1775. *Systema entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus.* 832 pp. Flensburg and Leipzig.

KARNY, H. H. 1907*a*. Ergebnisse der mit Subvention aus der Erbschaft Treitl unternommenen zoologischen Forschungsreise Dr. Franz Werner's nach dem ägyptischen Sudans und Nord-Uganda. IX. Die Orthopterenfauna des ägyptischen Sudan von Nord-Uganda (Saltatoria, Gressoria, Dermaptera) mit besonderer Berucksichtigung der Acridoideengattung *Catantops*. *Sber. Acad. Wiss. Wien* **116** (I) : 267–378, 3 pls.

—— 1907*b*. Revisio Conocephalidarum. *Abh. zool.-bot. Ges. Wien* **4** (3) : 1–114, 21 figs.

—— 1912. Orthoptera. Fam. Locustidae. Subfam. Copiphorinae. *Genera Insect.* **139** : 1–89, 7 pls.

KIRBY, W. F. 1906. *A synonymic catalogue of Orthoptera* **2,** Pt. 1, viii + 562 pp. London.

RAGGE, D. R. 1955. *The wing-venation of the Orthoptera Saltatoria with notes on Dictyopteran wing-venation.* vi + 159 pp., 106 figs. London.

—— 1957. A revision of the genus *Tropidonotacris* Chopard, 1954 (Orthoptera: Tettigoniidae). *Proc. R. ent. Soc. Lond.* (B) **26** : 119–122, 7 figs.

REDTENBACHER, J. 1891. Monographie der Conocephaliden. *Verh. zool.-bot. Ges. Wien* **41** : 315–562, 1 pl.

SAMPSON, J. 1961. A method of replicating dry or moist surfaces for examination by light microscopy. *Nature, Lond.* **191** : 932–933, 2 figs.

SCHAUM, H. 1853. Gesammtsitzung der Akademie (15 December). *Ber. Verh. Akad. Wiss. Berl.* **1853** : 747–780.

SERVILLE, J. G. A. 1838. *Histoire naturelle des insectes. Orthoptères.* xviii + 776 pp., 14 pls. Paris.

ZIMSEN, E. 1964. *The type material of I. C. Fabricius.* 656 pp., 2 pls. Copenhagen.

BRITISH MUSEUM
15 APR 1969
NATURAL HISTORY

D. R. RAGGE, Ph.D., D.I.C., A.R.C.S.
*Department of Entomology*
BRITISH MUSEUM (NATURAL HISTORY)
CROMWELL ROAD
LONDON, S.W.7

# A LIST OF SUPPLEMENTS TO THE ENTOMOLOGICAL SERIES OF THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

1. MASNER, L. The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Pp. 143. February, 1965. £5.
2. NIXON, G. E. J. A reclassification of the tribe Microgasterini (Hymenoptera: Braconidae). Pp. 284; 348 Text-figures. August, 1965. £6.
3. WATSON, A. A revision of the Ethiopian Drepanidae (Lepidoptera). Pp. 177; 18 plates, 270 Text-figures. August, 1965. £4 4*s*.
4. SANDS, W. A. A revision of the Termite Subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. Pp. 172; 500 Text-figures. October, 1965. £3 5*s*.
5. AHMAD, I. The Leptocorisinae (Heteroptera: Alydidae) of the World. Pp. 156; 475 Text-figures. November, 1965. £2 15*s*.
6. OKADA, T. Diptera from Nepal. Cryptochaetidae, Diastatidae & Drosophilidae. Pp. 129; 328 Text-figures. £3.
7. GILIOMEE, J. H. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera : Coccoidea). Pp. 168; 43 Text-figures. February, 1967. £3 3*s*.
8. FLETCHER, D. S. A revision of the Ethiopian species and a check list of the world species of *Cleora* (Lepidoptera: Geometridae). Pp. 119; 14 plates, 146 Text-figures, 9 maps. February, 1967. £3 10*s*.
9. HEMMING, A. F. The Generic Names of the Butterflies and their type-species (Lepidoptera : Rhopalocera). Pp. 509. August, 1967. £8 10*s*.
10. STEMPFFER, H. The Genera of the African Lycaenidae (Lepidoptera : Rhopalocera). Pp. 322; 233 Text-figures. Coloured frontispiece. September, 1967. £8.
11. MOUND, L. A. A review of R. S. Bagnall's Thysanoptera Collections. Pp. 184: 82 Text-figures. May, 1968. £4.
12. WATSON, A. The Taxonomy of the Drepaninae represented in China, with an Account of their World Distribution (Lepidoptera : Drepanidae). Pp. 151: 293 Text-figures, 14 plates. November, 1968. £5.
13. AFIFI, S. A. Morphology and Taxonomy of Adult Males of the families Pseudococcidae and Eriococcidae (Homoptera : Coccoidea). Pp. 210: 52 Text-figures. December, 1968. £5.

PRINTED IN GREAT BRITAIN BY ADLARD & SON LIMITED, BARTHOLOMEW PRESS, DORKING

# STUDIES ON AUSTRALIAN MUSCIDAE (DIPTERA)

# II. A REVISION OF THE TRIBE DICHAETOMYIINI EMDEN

A. C. PONT

BRITISH MUSEUM
10 JUN 1969
NATURAL HISTORY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 6
LONDON : 1969

# STUDIES ON AUSTRALIAN MUSCIDAE (DIPTERA)
# II. A REVISION OF THE TRIBE DICHAETOMYIINI EMDEN

BY

ADRIAN CHARLES PONT
British Museum (Natural History), London

BRITISH MUSEUM
10 JUN 1969
NATURAL HISTORY

*Pp.* 191–286; 105 *Text-figures*

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 6
LONDON: 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In* 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Vol.* 23, *No.* 6 *of the Entomological series. The abbreviated titles of the periodicals cited follow those of the World List of Scientific Periodicals.*

*World List* abbreviation:
*Bull. Br. Mus. nat. Hist.* (Ent.).

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued* 28 *May*, 1969 *Price* £2

# STUDIES ON AUSTRALIAN MUSCIDAE (DIPTERA)
# II. A REVISION OF THE TRIBE DICHAETOMYIINI EMDEN

*By* A. C. PONT

## CONTENTS

| | Page |
|---|---|
| SYNOPSIS | 193 |
| INTRODUCTION | 194 |
| TECHNIQUE AND CHARACTERS USED | 194 |
| CORRECTIONS TO MY 1967 PAPER | 196 |
| SOURCES OF MATERIAL | 197 |
| ACKNOWLEDGEMENTS | 197 |
| BIOLOGY | 198 |
| SYSTEMATICS | 199 |
| Tribe Dichaetomyiini Emden | 199 |
| Species-Groups | 200 |
| Key to Australian Species-Groups and Species of *Dichaetomyia* Malloch | 200 |
| *quadrata*-group | 209 |
| *armata*-group | 211 |
| *impar*-group | 217 |
| *vicaria*-group | 230 |
| *polita*-group | 256 |
| *demens*-group | 259 |
| *rufescens*-group | 262 |
| CATALOGUE OF AUSTRALIAN DICHAETOMYIINI | 276 |
| REFERENCES | 276 |
| INDEX | 278 |

## SYNOPSIS

A systematic revision of the Australian species of *Dichaetomyia* Malloch is presented. A key to species is given, and all species except for *megophthalma* Malloch are redescribed and illustrated. Species-groups for the Australian fauna are proposed. Summaries of biology, ecology and distribution are given, and the puparium of *parimpar* sp. n. is described.

Twenty species are considered of which eleven are described as new: *arrogans*, *aseta*, *australis*, *breviseta*, *collessi*, *fulvohirta*, *fusconota*, *parimpar*, *rufaeformis*, *soror* and *spinuligera*. *D. parviseta* is described from the Solomon Islands. *D. emdeni* n. n. is proposed as a replacement name for *polita* Malloch, the type-species of the genus, a secondary homonym of *polita* (Stein). *Agdestis* Séguy is a new junior synonym of *Dichaetomyia* Malloch. *D. helomyzina* (Stein) and *spinipes* (Stein) are new junior synonyms of *significans* (Walker), *rufa* (Stein) and *rufa* var. *personata* Bezzi are new junior synonyms of *vicaria* (Walker), and *luteohirta* Malloch is a new junior synonym of *reversa* (Walker). Notes are given on the related species *impar* (Stein), *apicalis* (Stein) and *rufescens* (Stein).

All relevant types have been studied, except for those of *megophthalma* Malloch and *flavohirta* Malloch, and in the case of misidentified species all pertinent material has been seen. A neotype is designated for *spinipes* Stein, and lectotypes for *impar* Stein and *rufa* var. *personata* Bezzi.

## INTRODUCTION

This second study in the series on Australian Muscidae presents a revision of the tribe Dichaetomyiini of the Phaoniinae which, in Australia, includes only the type-genus *Dichaetomyia* Malloch. The previous study (Pont, 1967*a*) gave a revision of the *quadrata*- and *armata*-groups of *Dichaetomyia*, and the present paper offers supplementary data on these groups and a revision of the remaining Australian species.

The first and last revision of the Australian species was by Malloch (1925) who dealt with the ten species known to him, of which four were described as new. The present study, based on a much richer material than Malloch had, raises the number of Australian species to twenty, of which fourteen have been described as new. In addition, one non-Australian species is described here. Study of the available types has revealed a number of misidentifications, and some new synonymy has also been found, all of which is discussed below in the text. It is scarcely likely that this represents the total number of Australian species: more intensive collecting in the remoter parts of North Queensland will undoubtedly result in the discovery of further species.

Since the time of Malloch no work had been done on the Indo-Australasian *Dichaetomyia* until the last few years. Emden (1965) has revised the Oriental species, and as he studied most of the pertinent types in addition to giving thorough keys and descriptions his paper is invaluable for the study of the genus. Snyder (1965) and Hori & Kurahashi (1967) have revised the Micronesian and some Japanese species respectively, but none of these authors had access to types nor to extra-limital material, and Hori & Kurahashi did not use Emden's paper. Their work therefore contains errors. Work for the present paper has been carried out as part of a general revision of Indo-Australasian *Dichaetomyia*, and I have been able to study not only Emden's material and many other named collections but also a collection of over 1,500 unidentified Melanesian *Dichaetomyia*, so that it has been possible to fit this Australian revision into a more general framework of studies.

For this paper all the Australian species have been studied and redescribed except for *megophthalma* Malloch. This species is still known only from the holotype, which I was unable to study, but it has been included in the key on the basis of information supplied by Mr. G. C. Steyskal. Species described in my previous paper (Pont, 1967*a*) are not redescribed here. Extra-limital material has been listed for the sake of completeness, and such biological information as is available has also been included.

## TECHNIQUE AND CHARACTERS USED

In his revision of Australian *Dichaetomyia* (1925 : 324), J. R. Malloch wrote: " As in the great majority of the Oriental species of the genus there are few striking specific characters one must resort to minute details for distinguishing the species. These however appear to be quite constant and with little practice one can readily distinguish the species. " The present work attempts to clarify the Australian species but it has not been possible to make the study of this complex and subtle genus any less difficult than Malloch found it to be. Some species (e.g., the *armata*-group) are comparatively simple to distinguish in the male sex, but others and particularly females lack such striking structural features and other less obvious characters have to be used.

Characters of colour and dusting, and the presence or absence of fine hairs, are difficult to appreciate unless the specimen is in perfect condition. For this reason a large number of alternatives is given in the key whenever possible, and all critical characters are illustrated. In greasy specimens, pale setulae appear dark, and pale hairs, such as those on the metepisternum and squamopleuron, can only be distinguished with the utmost care. Previous authors (Malloch, 1925; Snyder, 1965; Hori & Kurahashi, 1967) have stated that certain parts of the body (hypopleuron, squamopleuron, stem-vein) are bare or vary individually between bare and haired, but I have found that these areas are usually consistently haired or bare and that such statements often imply that the hairs in question have been overlooked.

Terminology follows that in use by other students of the Muscidae, and an explanation of abbreviations is given in my previous paper (Pont, 1967*a* : 620). Text-figs. 1–3 illustrate unfamiliar characters that are used here. The *squamopleuron* (Text-fig. 1) is that part of the metanotum below the lower squama, dorsad of the supra-spiracular convexity. The *metepisternum* (Text-fig. 1) is situated at the lower posterior angle of the hypopleuron, above the hind coxa: the term was suggested by Dr. J. R. Vockeroth (letter of 5th July, 1967) and is the same as Snyder's *pre-episternite III*. The *vallar ridge* (Text-fig. 1) is a small narrow lip-like sclerite above the sub-alar ridge, and Mr. G. C. Steyskal (letter of 13th November, 1967) pointed out to me that Hendel

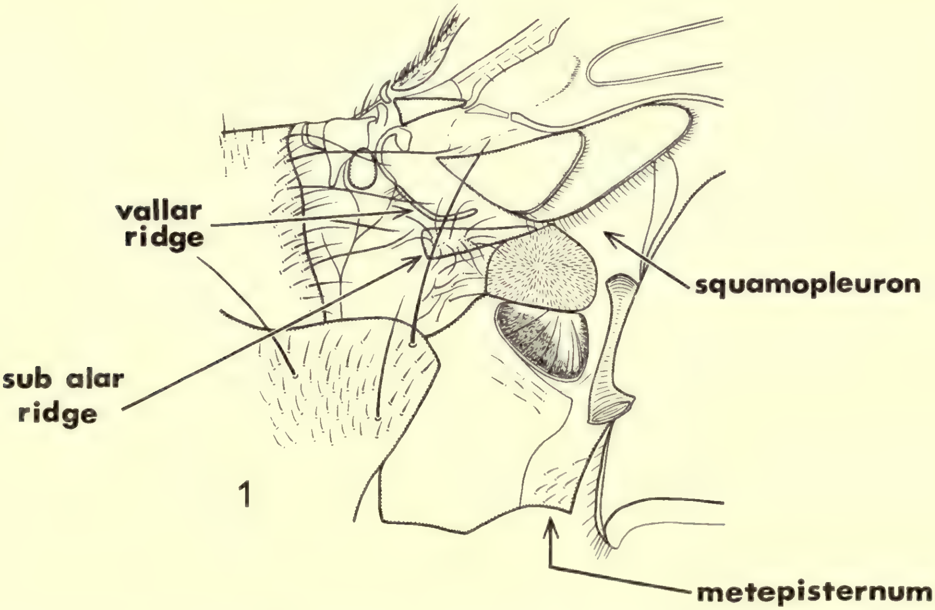


FIG. 1. Posterior part of pleura of *Dichaetomyia vicaria* (Walker) (Ingham, 17.vii.59, *Harley*, ♂).

(1900, *Verh. zool.-bot. Ges. Wien* **50** : 325) had named this sclerite: it may or may not bear hairs on the anterior part. *The ridge between inner post-alar seta and scutellum* is indicated by the arrows in Text-figs. 2 and 3: it may or may not bear setulae.

Small specific differences have been found in the structure of the male 5th sternite and hypopygium. These organs have been illustrated for each species, except for *megophthalma*.

Characters given in the key and the species-group descriptions are not repeated in the specific descriptions. Otherwise the species have been fully redescribed, and all available information on variation, relationships, habits and distribution has been given.

All illustrations have been prepared by the author, using a squared eye-piece. 5th sternites and cercal plates have all been drawn to the same scale; lateral views of the hypopygia are drawn at 1·5 times this scale.

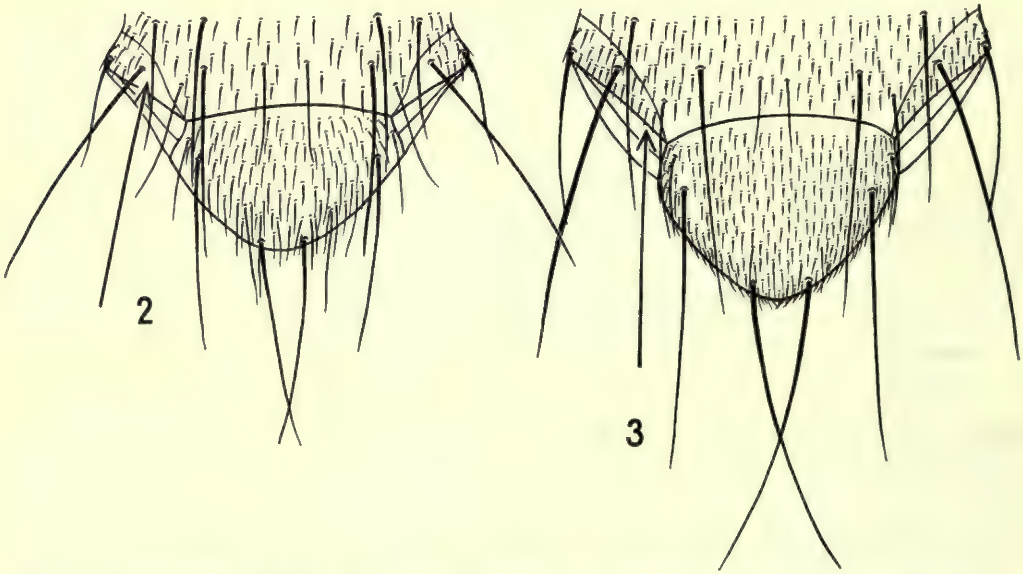
## CORRECTIONS TO MY 1967 PAPER

The following corrections to my previous paper (Pont, 1967*a*) should be noted:

p. 632. Under *armata*, line 9. Delete " Material examined ", and transfer lectotype data to between lines 1 and 2 (to before " Lectotype Designation ").

p. 633. On the block of figures, fig. 14 is of *norrisi* and should be numbered " 15 ", fig. 15 is of *significans* and should be numbered " 14 ".

p. 635. Line 33. Delete " Material examined ", and transfer lectotype data to p. 632 to between lines 1 and 2 under *significans* (to before " designated by Pont ").



FIGS. 2–3. Scutellum and post-alar ridge, dorsal view, of: 2, *Dichaetomyia rufaeformis* sp. n. (holotype); 3, *D. significans* (Walker) (TPNG, Nineia, Moroke, v. 60, *McMillan*, ♂).

## SOURCES OF MATERIAL

Some 900 Australian specimens of *Dichaetomyia* have been studied for this paper. This and other material discussed is located in the following museums and institutions (abbreviations given are those used throughout the text in the lists of material examined):

Zoölogisch Museum der Universiteit van Amsterdam (Amsterdam); The Australian Museum, Sydney (Aust. Mus.); British Museum (Natural History), London (BMNH); Bernice P. Bishop Museum, Honolulu (Bishop); Universitetets Zoologiske Museum, Copenhagen (Copenhagen); Division of Entomology, C.S.I.R.O., Canberra (CSIRO); Museo Civico di Storia Naturale, Genoa (Genoa); Museo Civico di Storia Naturale, Milan (Milan); Muséum National d'Histoire Naturelle, Paris (Paris); Queensland Department of Primary Industries, Brisbane (Qld. Dept. Pr. Ind.); Queensland Museum, Fortitude Valley, Queensland (Qld. Mus.); South Australian Museum, Adelaide (S.A. Mus.); School of Public Health and Tropical Medicine, Sydney (SPHTM); United States National Museum, Washington (USNM); National Museum of Victoria, Melbourne (Vict. Mus.); Zoologisches Museum der Humboldt-Universität zu Berlin (ZMB).

## ACKNOWLEDGEMENTS

It gives me great pleasure to thank the following colleagues for the loan of types and other material from the collections in their care: Dr. R. A. Brimblecombe (Qld. Dept. Pr. Ind.); Dr. D. H. Colless (CSIRO); Dr. E. Dahms (Qld. Mus.); Mr. W. N. Ellis (Amsterdam); Dr. J. L. Gressitt (Bishop); Dr. G. F. Gross (S.A. Mus.); Dr. D. Guiglia (Genoa); Professor D. J. Lee (SPHTM); Dr. C. Leonardi (Milan); Dr. L. Lyneborg (Copenhagen); Mr. D. K. McAlpine (Aust. Mus.); Dr. A. Neboiss (Vict. Mus.); Mr. K. R. Norris (CSIRO); Dr. H. Schumann (ZMB); Mr. G. C. Steyskal (USNM); Dr. L. Tsacas (Paris); Dr. J. R. Vockeroth (formerly at Bishop).

For discussion, advice, and help in various ways during the course of this work, I am very grateful to Dr. D. H. Colless, Dr. R. W. Crosskey (Commonwealth Institute of Entomology, London), Professor D. J. Lee, Mr. D. K. McAlpine, Mr. K. R. Norris, Mr. H. Oldroyd (BMNH), Mr. H. E. Paterson (Nedlands, W. Australia), Mr. G. C. Steyskal, Dr. J. Verbeke (Brussels), and Dr. J. R. Vockeroth.

I am most grateful to Mr. G. C. Steyskal for information on Malloch's types of *Dichaetomyia megophthalma* and *flavohirta*, and for checking their positions in my key.

Mr. D. K. McAlpine, and Dr. D. H. Colless, Mr. K. R. Norris and their colleagues at CSIRO, have most willingly supplied notes and recollections on the localities where they have collected *Dichaetomyia* and on the habits of these flies.

This work could scarcely have been completed without the continual invaluable encouragement and support of Dr. D. H. Colless who has made material available to me from his own and other museums, dealt with innumerable enquiries, and made special collections of *Dichaetomyia* during the course of his own field-work.

## BIOLOGY

What is known of the life-history and biology of *Dichaetomyia* has been summarized by Emden (1942 : 674–675, and 1965 : 334), Snyder (1965 : 297) and Hori & Kurahashi (1967 : 68). So far as I know, the only larval mouth-hooks and spiracles illustrated are those of *nubiana* (Bigot), figured by Emden (1965 : figs. 10 h and 11 o). I have been unable to find the material upon which these illustrations are based. Not a single life-history is known *in toto*, and the only biological data available are random observations on a few scattered species.

Adult *Dichaetomyia* are found in the bush and in open country. They sometimes frequent faeces and even enter houses. Females are oviparous or ovoviviparous. Vivipary has been attributed to one species, but I very much doubt this as no ovipositor I have studied is adapted for vivipary. Larvae have been found in cattle dung, and they are saprophagous or coprophagous. Older larvae may be predaceous. According to Emden (1965 : 20) the dental sclerites are fused with each other so as to form a median ventral arch. This observation, if correct, confirms carnivory in at least the last larval instar.

So far as Australian species are concerned, the following facts are available, none of which have been reported previously.

Adult *Dichaetomyia* are most abundant in the north of Queensland, though some species have extended their range into Northern Territory and New South Wales. They are most commonly found in tropical rain forest, even in residual patches in dairy country or in narrow riverine tracts in dry country. They also occur in dry and wet sclerophyll forest, eucalyptus forest, agricultural country, savannah woodland, grassland savannah, and even in more open country and near the sea-shore. The emphasis seems to be on humid or shaded localities, though trappings frequently lure them into the open. Some species appear to be restricted to rain forest (*polita*-, *demens*- and *rufescens*-groups), whilst others are more tolerant of drier conditions (*quadrata*-, *armata*-, *impar*- and *vicaria*-groups). Records show a distribution from sea-level up to 1,520 m. They appear throughout the summer months.

Adults are most frequently collected on leaves or by sweeping vegetation. They have been trapped in carrion-baited blowfly traps, buffalo-fly traps, Western Australian fly-traps, Malaise-traps and light traps. Some species have been collected on human faeces, and have been found in houses.

The puparium of one Australian species is known. The larva was found in a rotting log in wet sclerophyll forest just above rain forest. The dental sclerites are not fused ventrally, which indicates saprophagy. The posterior spiracles are closer together than in *nubiana* (cf. Emden, 1965 : fig. 11 o). A remarkable structure is present in the lateral hooks that is apparently absent in *nubiana* (cf. Emden, 1965 : fig. 10h): the lateral hooks are spanned posteriorly by a narrow chitinous bridge which in its turn bears a weakly chitinized strip, possibly an apodeme. For fuller discussion, see below under *parimpar* (p. 222, and Text-figs. 34–37).

The genus is of no known agricultural or veterinary importance. Adults may be of some slight hygienic significance as they may act as mechanical vectors of faecal- and carrion-borne pathogens.

## SYSTEMATICS

### Tribe **DICHAETOMYIINI** Emden, 1951

*Dichaetomyiini* Emden, 1951 : 377 and 679.

Diagnosis: Muscid flies with lower squama of the *Phaonia*-type, hind tibia without a calcar seta, prosternum and pteropleuron setulose, metathoracic spiracle with a row of black setulae along lower margin, arista long-plumose, vein 1 bare.

Emden (1942 : 675–676) included the genera *Graueria* Curran, *Neaveia* Malloch, *Dichaetomyia* Malloch and *Pyrellina* Malloch in his " *Dichaetomyia*-group ", and in the same work (1942 : 736) synonymized *Neaveia* with *Dichaetomyia*. Subsequently (1951 : 376) he raised the group to tribal rank and removed *Graueria* to the Phaoniini. In his recent revision of Oriental Muscidae (1965 : 332–333) he has added a new genus *Tamilomyia* to the Dichaetomyiini. Hennig (1963 : 899–900, and 1965 : 46 ff.) removed *Pyrellina* to the Muscini, and included in the tribe the Oriental *Auria* Malloch, the Indo-Australasian *Rhynchomydaea* Malloch, the Australian *Hardyia* Malloch and *Gordonia* Malloch, and the Ethiopian *Alluaudinella* Giglio-Tos, *Aethiopomyia* Malloch and *Ochromusca* Malloch.

Within the Australian fauna, the two genera *Rhynchomydaea* and *Hardyia* do not in my opinion belong to this tribe, and *Gordonia* Malloch (a junior synonym of *Myiophaea* Enderlein) belongs to the Muscini (Pont, 1967*b*), so that the only representative is the type-genus.

### ***DICHAETOMYIA*** Malloch, 1921

*Dichaetomyia* Malloch, 1921*a* : 163. Type-species: *Dichaetomyia polita* Malloch, 1921, *nec* Stein, 1900 [= *emdeni* n. n.], by original designation and monotypy.

*Neaveia* Malloch, 1921*b* : 427. Type-species: *Neaveia flavida* Malloch, 1921, by original designation and monotypy. (Synonymy by Emden, 1942 : 736.) Preoccupied by *Neaveia* Druce, 1910 : Lepidoptera.

*Lophomala* Enderlein, 1927 : 54. Type-species: *Mydaea flavipalpis* Stein, 1915, by designation of Malloch, 1928*a* : 468. (Synonymy by Séguy, 1937 : 344.)

*Panaga* Curran, 1928 : 353 (as subgenus of *Dichaetomyia*). Type-species: *Dichaetomyia* (*Panaga*) *limbipennis* Curran, 1928 [= *Spilogaster albivitta* Stein, 1906], by monotypy. (Synonymy by Séguy, 1937 : 344.)

*Macroxanthomyia* Malloch, 1930 : 473 (as subgenus of *Dichaetomyia*). Type-species: *Dichaetomyia distanti* Malloch, 1921, by original designation. (Synonymy by Séguy, 1937 : 344.)

*Agdestis* Séguy, 1937 : 359. Type-species: *Agdestis kouligianus* Séguy, 1937, by original designation and monotypy. **syn. n.**

*Dichaetomyia polita* Malloch is a secondary junior homonym of *polita* Stein, 1900, described as a species of *Spilogaster* Macquart but in fact belonging to *Dichaetomyia* (Pont, in press). *D. polita* Malloch is herewith renamed as *emdeni* **n.n.**, in honour of the late Dr. F. I. van Emden for his outstanding work on this genus.

Diagnosis: As for the tribe. Distinguished from the other Old World genera of Muscidae by the setulose pteropleuron, metathoracic spiracle with black setulae along lower margin, and *Phaonia*-type lower squama.

Distribution: Throughout the Old World tropics, impinging upon the Palaearctic region (West Europe, Caucasus, Japan). In Australia known only from the north-eastern states, New South Wales, Queensland, Northern Territory, and islands in the Torres Strait.

Biology: See above (p. 198).

## SPECIES-GROUPS

No attempt has previously been made to divide the species of *Dichaetomyia* into groups. Such a course is very desirable since there are clearly several hundred described and undescribed species in the genus, and the author has been working on such a project for some years. This study is still incomplete, but a number of groups is proposed and described in this paper. These are based on a study of most of the described species of the Indo-Australasian region in addition to a large number of undescribed ones, but it is probable that further studies will result in much modification. For the present, however, and in the context of Australian studies, these groups are considered satisfactory.

In the species-group descriptions, the first paragraph contains the diagnostic characters of the group. The second paragraph includes the supporting characters, which are found to vary from group to group but which are not necessarily diagnostic in whole or in part.

### KEY TO AUSTRALIAN SPECIES-GROUPS AND SPECIES OF *DICHAETOMYIA* MALLOCH

1 Scutellum setulose laterally, the discal setulae descending multiserially on to lateral surface of scutellum and at some points invading ventral surface.

Palpi yellow or mainly so. Vallar ridge bare (cf. Text-fig. 1). Propleural, pteropleural and hypopleural setulae all black. Squamopleuron bare. Stem-vein bare above . . . . . . . . . . . . . . 2

– Scutellum bare laterally, at the most with up to 12 setulae present in 1–2 irregular rows on upper part of lateral margin on or just below the level of the strong setae . 5

2 Scutellum of normal shape, viewed from above broader than long (the width measured between the sub-basal lateral setae) (Text-fig. 2). Tergite 5 entirely shining, without any dusting. Lower *stpl* seta much longer and stronger than the anterior one, placed closer to the posterior one than to the anterior one. Abdominal macrochaetae normal, comparatively weak and semi-decumbent. *Prsc acr* setae placed in front of the transverse level of the *prsc dc* setae. The depth below lowest eye-margin equal to width of 3rd antennal segment. Fore tibia without a submedian *p* seta. 4 *post dc* setae. Post-alar callus with setulae present on the ridge between inner seta and scutellum (as in Text-fig. 3). ♂: frons slender, at narrowest point eyes separated by at most twice diameter of anterior ocellus, interfrontalia seam-like, *ors* hair-like and rudimentary; hind femur with only normal rows of setae on ventral surfaces, an *av* row in apical half and a *pv* row in basal two-thirds; lobes of 5th sternite without shining prolongations (Text-fig. 61). ♀: *vte* hardly shorter than *vti*. Bulky species [*quadrata*-group] . . ***D. johannis*** Pont (p. 210)

– Scutellum elongate, viewed from above as long as broad (Text-fig. 3). Tergite 5 at least partly dusted, if without conspicuous dusting then shagreened and not glossy. Lower *stpl* seta subequal to or weaker than anterior one, equidistant or almost equidistant from the two upper ones. Abdominal macrochaetae on tergites 4 and 5 very strong and erect. *Prsc acr* setae placed behind the transverse level of the *prsc dc* setae. The depth below lowest eye-margin equal to only half width of 3rd antennal segment. Fore tibia often (♂) or always (♀) with a submedian *p* seta. ♂: frons broad, at narrowest point eyes separated by at least width of 3rd antennal segment, interfrontalia distinct and broad, *ors* strong; hind femur strikingly modified on ventral surfaces, with either tubercules or spines or tufts of setae or dense rows of long wavy setae; 5th sternite with a shining prolongation to each lobe (Text-figs. 43–45). ♀: *vte* short, at most half length of *vti* (*longiseta*), otherwise scarcely distinguishable from the adjacent post-ocular setulae. Elongate species [*armata*-group] . . . . . . . . . . . . . 3

3 3 *post dc* setae. Post-alar callus without setulae present on the ridge between inner seta and scutellum (as in Text-fig. 2). ♂: mid femur with up to 6 *pv* setae, otherwise without ventral setae, with a few *ad* setae in basal third; mid tibia with only the normal 2 short *p* setae; hind femur on ventral surfaces with neither tufts of setae nor tubercles nor spines, with series of long dense fine rather wavy setae, the *av* row beginning at basal $\frac{1}{6}$ to $\frac{2}{5}$, the *pv* row at basal $\frac{1}{2}$ to $\frac{1}{3}$, with equally dense setae between the rows; hind femur without *a* setae; hind tibia without *p* setulae on median third. ♀: *vte* about half length of *vti*, much stronger than the adjacent post-ocular setulae **D. longiseta** Pont (p. 212)

– 4 *post dc* setae. Post-alar callus with setulae present on the ridge between inner seta and scutellum (Text-fig. 3). ♂: mid femur either without any ventral setae or with numerous long dense setae on *pv* surface, without *ad* setae; mid tibia with the *p* setae extremely long, and with other modifications; hind femur on ventral surface with a strong spine in apical half, and in basal half with either a tubercle bearing numerous dense setae or a tuft of strong almost coagulated setae; hind femur with some strong *a* setae; hind tibia with some short fine erect *p* setulae on median third. ♀: *vte* very short, much less than half length of *vti* and scarcely distinguishable from the adjacent post-ocular setulae . . . . . . . . . . 4

4 ♂: fore tibia with a very long fine submedian *p* seta; mid femur without ventral setae; mid tibia with only 2 *p* setae, with long dense setulae on *pv* to *v* surfaces; hind femur in basal half with a tubercle bearing numerous short stout setae that are flexed at tips. ♀: hind femur without any ventral setae in basal half; tergite 4 without marginal macrochaetae but with only short decumbent setae that are not or hardly different from those on tergites 1 + 2 and 3; fore femur with 1 *pv* seta at base and 4–5 in apical half, bare medially; parafrontalia more yellowish to brownish pruinose; dusted mesonotal vittae weaker, the *dc* ones usually weak behind suture, often obsolescent between 3rd *dc* and scutellum . . . **D. norrisi** Pont (p. 213)

– ♂: fore tibia without a submedian *p* seta; mid femur with numerous long dense setae on *pv* surface; mid tibia with more than 2 *p* setae, and with ancillary setae on adjacent surfaces, without a row of long dense setulae ventrally; hind femur without a tubercle in basal half, but instead with a tuft consisting of a few coagulated long setae. ♀: hind femur with 1–4 weak ventral setae in basal half; tergite 4 with at least 2 strong erect marginal macrochaetae, similar to those on tergite 5 and very strikingly stronger and more erect than the weak decumbent marginals on tergites 1 + 2 and 3; fore femur with the *pv* row of setae complete, though weak in basal half; parafrontalia more silvery white to yellowish pruinose; dusted mesonotal vittae denser, the *dc* ones of uniform density from neck to scutellum . . . **D. significans** (Walker) (p. 214)

5 3 strong *post dc* setae preceded by a weak fourth seta that is only about twice the length of a ground-setula, the first strong *post dc* seta thus usually closer to the second strong seta than to suture or midway between these two points.

*Prsc acr* setae placed behind the transverse level of the *prsc dc* seta. Fore tibia without a submedian *p* seta. Squamopleuron bare. Metepisternum haired, otherwise hypopleuron bare. Stem-vein bare above. Pteropleuron virtually entirely dark setulose. Metatarsi and tibiae yellow. Disc of notopleuron with a few dark setulae around the bases of both setae. Sternite 1 black setulose at sides. Mesonotum and scutellum virtually undusted [*impar*-group] . . . . . 6

– 3 or 4 strong *post dc* setae, without a weaker seta in front, the first strong *post dc* much closer to suture than to the second strong one . . . . . . . 7

6 Tergites 1 + 2 and 3 yellow or black fasciate or, rarely, entirely black in ground-colour, and the antero-lateral angles of tergite 4 also often black; tergites 4 and 5 always largely or wholly yellow, rarely discoloured by post-mortem decay, but in these cases the discoloured areas can with care be distinguished from the areas in which the ground-colour is truly black. Tergite 4 with the marginal row of setae weaker and less erect, the row usually interrupted medially. Tergite 5 with only 2–3 pairs of discal setae, confined to the lateral part of the tergite. 4th tarsal segment on all legs yellow. ♂: frons slender, at narrowest point eyes separated by diameter of anterior ocellus or less, the interfrontalia obsolete on median third of frons and not even a seam indicated, except in a few males where a weak seam is visible, upper inner eye-facets enlarged; *ori* separated from *ors* by a considerable bare gap (Text-fig. 30); viewed from above and behind, mesonotum with a pair of weak white-dusted *prst* vittae mesad of the *dc* setae, these sometimes fused into a single broad vitta, and along *prst dc* rows often with traces of more white dust, only three ♂ seen without any dust. ♀: prosternum with the setulae always yellow; parafrontalia silvery white pruinose on lower third, brownish grey pruinose above **D. parimpar** sp. n. (p. 219)

– Tergites 1 + 2 and 3 entirely yellow in ground-colour; tergites 4 and 5 always entirely black in ground-colour and sometimes the posterior margin of tergite 3 also black. Tergite 4 with the marginal row of setae stronger, more erect and uniform, and not interrupted at middle. Tergite 5 with more numerous and stronger discal setae, 4–5 pairs forming almost a complete row. 4th tarsal segment on all legs brownish to black. ♂: frons broader, at narrowest point eyes separated by twice diameter of anterior ocellus, by width of 3rd antennal segment in frontal view, the interfrontalia distinct throughout between the parafrontalia and at narrowest point equal to diameter of anterior ocellus, upper inner eye-facets not at all enlarged; *ori* not usually separated from *ors*, the gap filled by short setulae (Text-figs. 32–33); viewed from above and behind, mesonotum entirely undusted, without traces of any white dust at neck or along *prst dc* rows. ♀: prosternum with the setulae usually partly or entirely brown to black, sometimes entirely yellow; parafrontalia usually silvery white pruinose only at lunula, almost entirely brownish grey pruinose, but sometimes as in *parimpar* . . . **D. breviseta** sp. n. (p. 224)

7 4 strong *post dc* setae [*vicaria*-group] . . . . . . . . 8

– 3 strong *post dc* setae . . . . . . . . . . . . . 17

8 Post-alar callus without setulae present on the ridge between inner seta and scutellum (Text-fig. 2). Setulae on pteropleuron entirely black. Setulae on prosternum black, at most a few of the posterior ones yellow. Propleural and prostigmatal ground-setulae black. Vallar ridge bare, rarely with 1 hair on anterior part. Setulae on notopleuron and hairs on squamopleuron entirely black. Beard virtually entirely black, with at most a few pale setae right behind.

Scutellum with 0–4 setulae descending just below the level of the strong setae. Metatarsi yellow. ♂: frons very slender, at narrowest point eyes separated by less than diameter of anterior ocellus; 3rd antennal segment largely darkened beyond insertion of arista; tibiae yellow; mid femur without *pv* setae. ♀ (*megophthalma* unknown): mesonotum with a small median patch of white dust at neck . . 9

– Post-alar callus with setulae present on the ridge between inner seta and scutellum (as in Text-fig. 3). Setulae on pteropleuron either entirely yellow or brown above and yellow below. Setulae on prosternum yellow, rarely a few of the anterior or posterior ones brown. Propleural and prostigmatal ground-setulae yellow, or with a few brown ones intermingled with the yellow ones. Vallar ridge with several, usually pale, hairs on anterior part. Setulae on notopleuron and hairs on squamopleuron mainly or entirely yellow or brown. Beard with a few or many pale setae among the black ones.

Setulae on sternite 1 yellow. Hypopleuron with the hairs below spiracle and on metepisternum pale to brown . . . . . . . . . . 11

9 Hypopleuron with the hairs below spiracle and on metepisternum yellow. Setulae on sternite 1 yellow. ♂: hind femur with about 6 long median *pv* setae, more or less equal to femoral depth, and 2–3 preapical *av* setae; upper inner eye-facets strongly and conspicuously enlarged, frons very slender, at narrowest point eyes separated by less than diameter of one of the adjacent eye-facets. ♀: unknown; probably with some short *pv* setae on hind femur ***D. megophthalma*** Malloch (p. 238)

– Hypopleuron with the hairs below spiracle and on metepisternum black. Setulae on sternite 1 black. ♂: hind femur without submedian *pv* setae, if with *pv* setae in apical half then they are much longer than femoral depth and at the same time there are 4–6 long *av* setae in apical half; upper inner eye-facets no more enlarged than is usual, not strongly and conspicuously so, though frons at narrowest point may be slightly broader than diameter of one of the adjacent eye-facets. ♀: hind femur without *pv* setae . . . . . . . . . . . . . 10

10 ♂: hind femur with 4–6 *av* and 2–4 *pv* setae in apical half, all longer than femoral depth, otherwise bare ventrally (Text-figs. 4 and 6); *prsc acr* setae placed on or behind the transverse level of the *prsc dc*; auxiliary prostigmatal seta usually absent. ♀: indistinguishable from that of *rufaeformis* . . ***D. terraereginae*** Malloch (p. 231)

– ♂: hind femur with a short submedian *pv* seta, not as long as femoral depth, that is rarely indistinct, and with 2 long and 0–1 short preapical *av* setae, otherwise bare ventrally (Text-figs. 5 and 7); *prsc acr* setae placed in front of, rarely on, the transverse level of the *prsc dc*; auxiliary prostigmatal seta always present. ♀: indistinguishable from that of *terraereginae* . . . ***D. rufaeformis*** sp. n. (p. 234)

11 Pteropleuron with the setulae brown above and yellow below. *Prsc acr* setae placed behind, or rarely on, the transverse level of the *prsc dc*. Notopleuron with the setulae usually entirely black. Scutellum with 4–10 setulae descending just below the level of the strong setae. Beard with a few yellow setae among the black ones. Tibiae often brown to black. Metatarsi brown to black. ♂: frons very slender, at narrowest point eyes separated by diameter of anterior ocellus or less; 3rd antennal segment yellow. ♀: mesonotum without a small median patch of white dust at neck . . . . . . . . . . . . . . 12

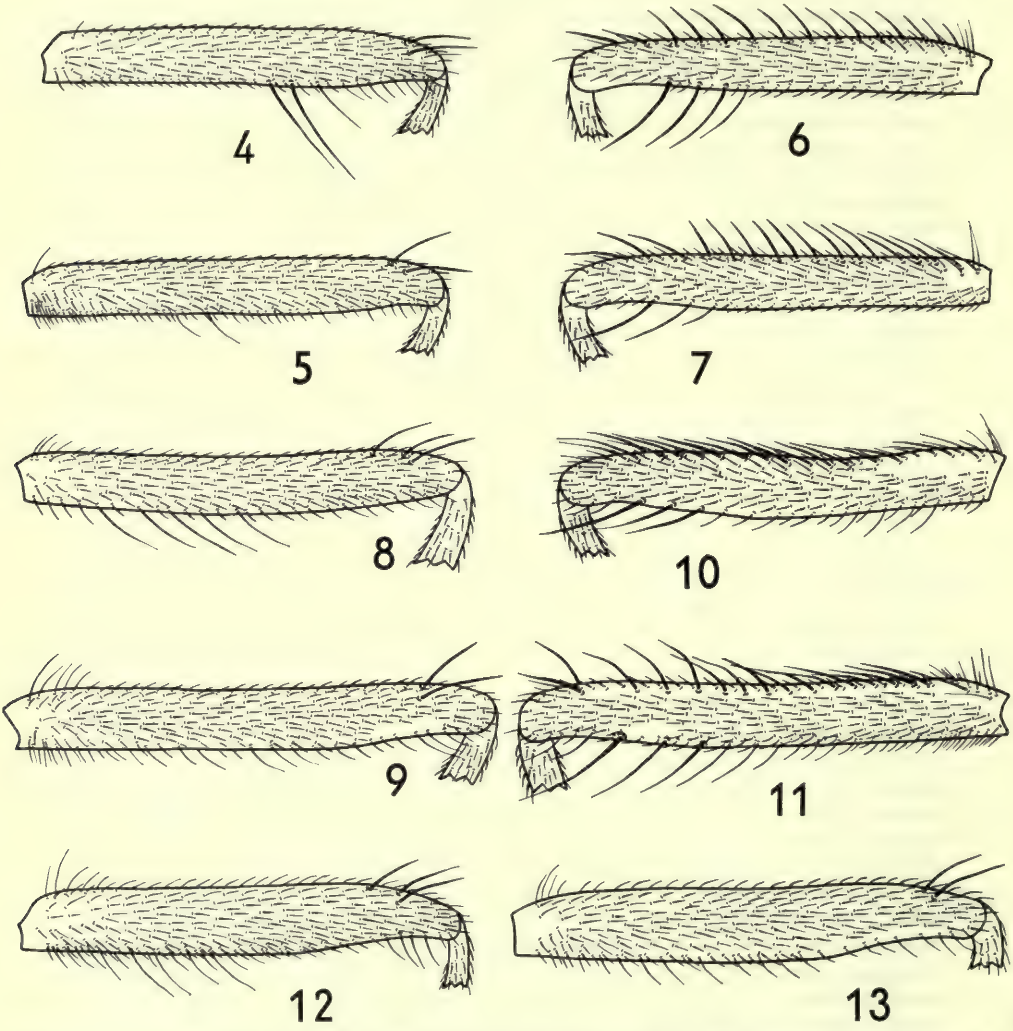
– Pteropleuron with the setulae entirely yellow. *Prsc acr* setae placed in front of, or rarely on, the transverse level of the *prsc dc*. Notopleuron with the setulae mainly or entirely pale. Scutellum with 0–4 setulae descending just below the level of the strong setae. Beard with numerous golden setae among the black ones. Tibiae always yellow. Metatarsi yellow to brown. ♂: frons slender, at narrowest point eyes separated by more than diameter of anterior ocellus, except in *flavohirta*; 3rd antennal segment usually infuscated beyond arista. ♀: mesonotum with a small median patch of white dust at neck . . . . . . . . . . 13

12 Hind femur with a series of about 4 *pv* setae in basal half, that equal (♂) or almost equal (♀) femoral depth (Text-figs. 8 and 12). Hind femur usually with 2(–3) *d* preapical setae. Tergites 1 + 2 to 4 fasciate: tergite 1 + 2 yellow, with a dark hind-margin, tergites 3 and 4 dark, with a yellow fore-margin. ♂: mid femur with a few *pv* setae in basal third that almost equal femoral depth; upper inner eye-facets conspicuously enlarged, frons at narrowest point not as broad as diameter of one of the adjacent eye-facets; scutellum undusted, even in posterior view; abdomen in posterior view virtually undusted . . ***D. australis*** sp. n. (p. 239)

– Hind femur without *pv* setae, though often with a few stronger setulae around middle (♂) or in basal half (♀), but these are never half as long as femoral depth (Text-figs. 9 and 13). Hind femur with 1 *d* preapical seta. Abdomen variable, never fasciate as above: varying from wholly yellow, to yellow with apical tergites darkened, sometimes even more extensively darkened, generally due to post-mortem decay. ♂: mid femur without *pv* setae, the longest setulae at most half femoral depth;

upper inner eye-facets not conspicuously enlarged, frons at narrowest point as broad as or broader than one of the adjacent eye-facets; scutellum in posterior view whitish dusted, more densely so in basal lateral corners; abdomen in posterior view rather thinly but uniformly grey to whitish grey dusted . ***D. vicaria*** (Walker) (p. 242)

13 ♂ . . . . . . . . . . . . . . . 14
— ♀ . . . . . . . . . . . . . . . 16



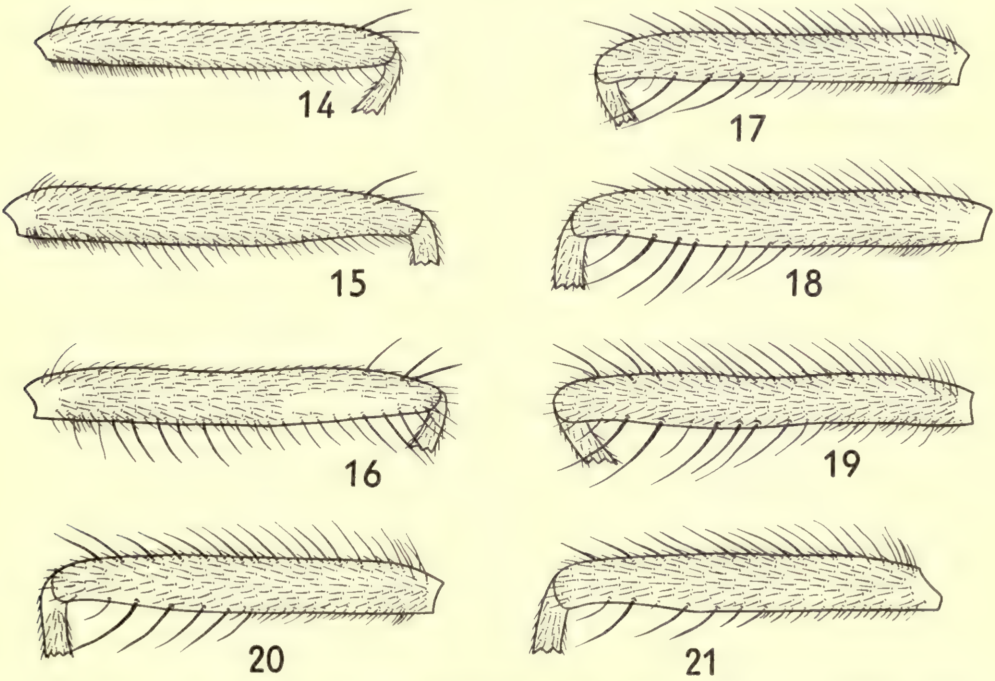
FIGS. 4–13. Hind femora of the *Dichaetomyia vicaria* group: 4, *D. terraereginae* Malloch, ♂, posterior view (Q, *Bancroft*, paratype); 5, *D. rufaeformis* sp. n., ♂, posterior view (Q, Byfield, *Norris*, paratype); 6, *D. terraereginae*, ♂, anterior view; 7, *D. rufaeformis*, ♂, anterior view; 8, *D. australis* sp. n., ♂, posterior view (Q, Bamaga, 28.iii.64, paratype); 9, *D. vicaria* (Walker), ♂, posterior view (Q, 14 mls S.W. of Sarina, 8.v.55); 10, *D. australis*, ♂, anterior view; 11, *D. vicaria*, ♂, anterior view; 12, *D. australis*, ♀, posterior view (Q, Kuranda, *Turner*, paratype); 13, *D. vicaria*, ♀, posterior view (Q, 14 mls S.W. of Sarina, 8.v.55).

14 Upper inner eye-facets strikingly and conspicuously enlarged, frons at narrowest point not as broad as one of the adjacent eye-facets and much narrower than diameter of anterior ocellus, interfrontalia completely obsolete on over median half of frons. Head in lateral view with the parafrontalia and parafacialia largely invisible. Parafacialia slender, opposite insertion of arista equal to slightly less than diameter of anterior ocellus.

Hind femur on *pv* surface with a series of slightly longer setulae, not half femoral depth, but without setae (Text-fig. 14); with a row of *av* setae, strongest in apical half, many longer than femoral depth, short and often vestigial towards base (Text-fig. 17) . . . . . . . . ***D. flavohirta*** Malloch (p. 248)

– Upper inner eye-facets not strikingly and conspicuously enlarged, at narrowest point of frons eyes separated by twice or a little over twice diameter of anterior ocellus, interfrontalia visible as a deep seam throughout and nowhere obsolete. Head in lateral view with the parafrontalia and parafacialia visible but slender. Parafacialia opposite insertion of arista equal to a little over diameter of anterior ocellus . . . . . . . . . . . . . . 15

15 Hind femur on *pv* surface with a series of slightly longer setulae, not half femoral depth, but without setae (Text-fig. 15); with a row of 7–9 *av* setae in apical half, many longer than femoral depth, bare in basal half (Text-fig. 18). Mid femur with at most a few *pv* setae in basal half, not nearly as long as femoral depth, usually without any setae distinct from the ground-setulae. Upper post-ocular setulae, below the upper row, black . . . . . . ***D. reversa*** (Walker) (p. 251)



FIGS. 14–21. Hind femora of the *Dichaetomyia vicaria* group. 14–16, ♂, posterior view, of: 14, *D. flavohirta* Malloch (Q, Cairns, ex corn, *Illingworth*); 15, *D. reversa* (Walker) (Thursday Is., *Copeman*); 16, *D. fulvohirta* sp. n. (holotype). 17–19, ♂, anterior view, of: 17, *D. flavohirta*; 18, *D. reversa*; 19, *D. fulvohirta*. 20–21, ♀, anterior view, of: 20, *D. flavohirta* (Q, Cairns, ex corn, *Illingworth*); 21, *D. reversa* (Q, Yeppoon, 10.v.55, *Norris*).

– Hind femur on *pv* surface with a weak row of setae that are longest around middle and just before apex where they are almost equal to femoral depth (Text-fig. 16); with a row of *av* setae, those in basal half short, those in apical half longer than femoral depth (Text-fig. 19). Mid femur with some long *pv* setae in basal half, as long as femoral depth, the row becoming shorter in apical half and merging with the ground-setulae. Upper post-ocular setulae, below the upper row, pale **D. fulvohirta** sp. n. (p. 255)

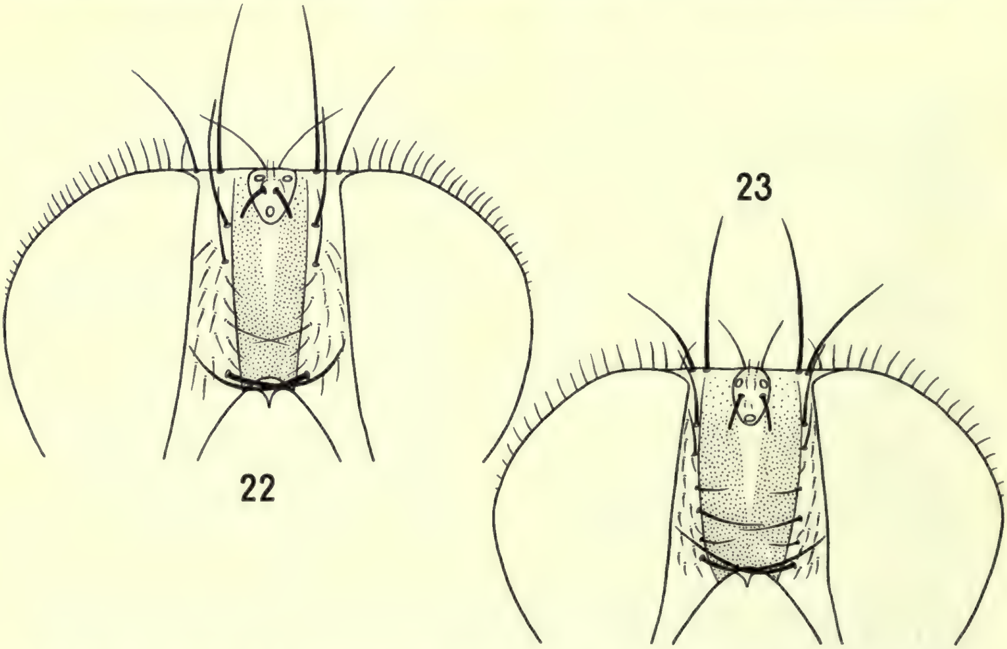
16 Hind femur with the *av* setae stronger, 3–4 strong and 2–5 weak setae in apical half (Text-fig. 20). Lower *ors* usually more than half length of upper *ors*. Frontal triangle usually slightly longer, extending well over half the distance from ocellar tubercle to lunula . . . . . . . **D. flavohirta** Malloch (p. 248)

– Hind femur with the *av* setae weaker, 1–2 strong and 4–5 weak setae in apical half (Text-fig. 21). Lower *ors* usually half, or less than half, length of upper *ors*. Frontal triangle usually slightly shorter, extending only half to two-thirds the distance from ocellar tubercle to lunula . . . . **D. reversa** (Walker) (p. 251)

17 Squamopleuron bare.
Femora and pleura entirely yellow. ♂: fore femur without a series of short *av* spinules in apical half. ♀: fore tarsi without the apical segments enlarged. . 18

– Squamopleuron haired.
Fore tibia without a submedian *p* seta [*rufescens*-group] . . . . 19

18 Fore tibia with a submedian *p* seta. Palpi entirely dark. Tergite 5 dark, with a yellow hind-margin. Hind cross-vein almost straight. Scutellum with 6–10 setulae descending in 1–2 irregular rows just below the level of the strong setae. Beard entirely black. ♂: scutellum in extreme posterior view with a small patch of whitish dust in each basal lateral angle; 2 pairs of fine reclinate *ors*; 3rd antennal segment beyond arista orange to weakly infuscated. ♀: viewed from above and



FIGS 22–23. Frons of ♀ *Dichaetomyia*, dorsal view: 22, *D. collessi* sp. n. (Q, Bamboo Ck, 25.iv.67, paratype); 23, *D. aseta* sp. n. (Q, Upp. Mulgrave R., 9.v.67, paratype).

behind, mesonotum with 3 narrow weak white dusted vittae, a pair along the *dc* rows, and a median one that is sometimes vestigial; tergite 4 with a row of marginal macrochaetae; at middle of frons a parafrontale half width of the interfrontalia; 1 strong pair of *ori* at lunula, with a weak pair above them (Text-fig. 22) [*polita*-group] . . . . . . . . . **D. collessi** sp. n. (p. 257)

– Fore tibia without a submedian *p* seta. Palpi yellow, sometimes darkened towards base. Tergite 5 yellow, with a pair of black lateral spots that are small in ♀. Hind cross-vein sinuate. Scutellum with only 2–5 setulae at or just below the level of the strong setae. Beard with a few golden setae among the black ones. ♂: scutellum even in extreme posterior view undusted; 1 pair of fine reclinate *ors*; 3rd antennal segment entirely pale yellow. ♀: viewed from above and behind, mesonotum undusted, with only faint traces of a median pale dusted patch at neck that sometimes continues just behind suture; tergite 4 without macrochaetae, or with just a few lateral marginals; at middle of frons a parafrontale a quarter width of the interfrontalia; 1 strong pair of *ori* at lunula, with 2–3 weak pairs above them (Text-fig. 23) [*demens*-group] . . . . . . . **D. aseta** sp. n. (p. 260)

19 Femora infuscated on all but apical quarter. Pleura largely infuscated. Propleural and prostigmatal ground-setulae entirely dark. ♀: viewed from above and behind, mesonotum rather densely dusted, with a paramedian pair of vittae, a pair of *prst* patches between *ph* and *dc*, and a pair of *post* vittae between *dc* and *ia* undusted.

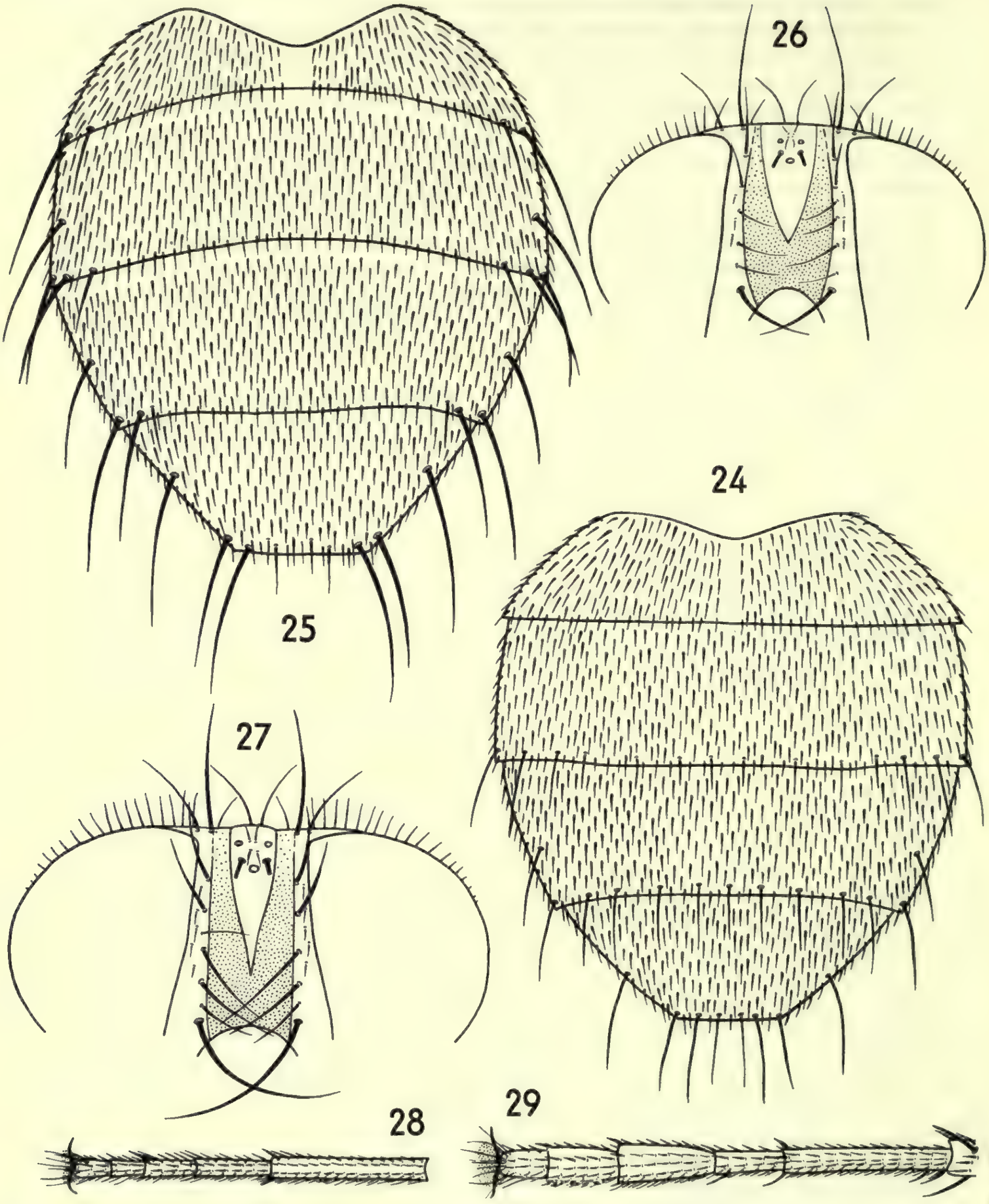
Palpi brown, extreme tips sometimes appearing yellowish. Beard entirely dark. Mesopleural ground-setulae entirely dark. Hypopleuron bare below spiracle, the hairs on metapisternum dark and pale. Squamopleuron with the hairs black. Sternite 1 dark setulose. All tarsi dark. Hind femur with a row of strong *pv* setae from base almost to apex (♂) (Text-fig. 38) or a few *pv* setae in basal half (♀); *av* setae as in Text-fig. 40. Mid femur with 1 *a* and 1 *ad* preapical setae. Abdomen entirely orange-yellow. Hind tibia with 1 *av* seta. ♂: fore femur without a row of *av* spinules; mid femur with a row of *pv* setae in basal half. ♀: fore tarsi normal (Text-fig. 28); supra-spiracular convexity pilose; *ori* above the lowest pair directed inwards (Text-fig. 26); abdominal macrochaetae as in Text-fig. 24 **D. fusconota** sp. n. (p. 266)

– Femora and pleura entirely yellow. Propleural and prostigmatal ground-setulae pale, or dark and pale. ♀: mesonotum with dusting very reduced, not as above . 20

20 ♂: fore and mid femora each with a series of short *av* spinules in apical half (Text-fig. 42); mid femur with a row of *pv* setae in basal half; hind femur with complete rows of *av* and *pv* setae (Text-figs. 39 and 41). ♀: segments 3–5 of fore tarsi dilated and flattened (Text-fig. 29); hind femur with some *pv* setae around middle; supra-spiracular convexity with conspicuous long pale setulae among the pile; viewed from above and behind, mesonotum with only 3 weak dusted vittae, a median one and a paramedian pair, from neck to 2nd *post dc* setae, and a lateral fascia along suture to *dc* rows; abdominal macrochaetae strong and stout, tergites 1 + 2 to 5 each with only 1 lateral discal and 2 lateral marginal setae, except for tergite 1 + 2 which lacks the discal (Text-fig. 25). Scutellum with 7–9 (♂) or 9–13 (♀) setulae in 1–2 irregular rows descending just below the level of the strong setae. Stem-vein bare above. Mid femur with 1 *a* and 1 *ad* preapical setae.

♀ *ori* above the lowest pair directed inwards and forwards (Text-fig. 27). Palpi yellow, except at base in ♂. Beard with some golden setae among the black ones. Prosternum entirely pale setulose. Squamopleuron with pale to dark hairs. Hind tibia with 1–2 *av* setae . . . . . . **D. spinuligera** sp. n. (p. 263)

– ♂: fore and mid femora without spinules; mid femur with no, or a few short, *pv* setae; hind femur with only 2–4 *av* setae, before apex, and without *pv* setae. ♀: fore tarsi normal (as in *fusconota*, Text-fig. 28); hind femur without *pv* setae; supra-spiracular convexity pilose only; viewed from above and behind, mesonotum completely undusted or with a lateral dusted fascia along suture to *dc* rows; abdominal macro-



FIGS. 24–29. *Dichaetomyia rufescens* group. 24–25, abdomen, ♀, dorsal view, of: 24, *D. fusconota* sp. n. (♀, Kuranda, ix.10, paratype); 25, *D. spinuligera* sp. n. (♀, Bamboo Ck, 25.iv.67, paratype). 26–27, frons, ♀, dorsal view, of: 26, *D. fusconota*; 27, *D. spinuligera*. 28–29, fore tarsus, ♀, dorsal view, of: 28, *D. fusconota* (right tarsus); 29, *D. spinuligera* (left tarsus).

chaetae normal and weak, tergites 4 and 5 only with some lateral discal and marginal setae (as in *fusconota*, Text-fig. 24). Scutellum with only 1–9 setulae descending just below the level of the strong setae. Stem-vein with a few microscopic hairs above, usually at base. Mid femur with only the *a* preapical seta, rarely individually also with an *ad* in *arrogans* . . . . . . . . . . . . 21

21 Palpi with at least apical half yellow, often entirely yellow. Hind tibia with 2(–3) *av* setae (1 only in 1 ♂ and 1 ♀). Beard with several golden setae among the black ones. Hypopleuron usually bare below the spiracle, sometimes with a few pale hairs. ♂: tergite 5 with only lateral discal setae. ♀: *ori* above the lowest pair directed inwards and forwards, and interfrontalia with the margins almost straight (as in *spinuligera*, Text-fig. 27) . . . . . ***D. arrogans*** sp. n. (p. 270)

– Palpi dark, rarely with extreme tips pale. Hind tibia with 1 *av* seta (2 in 1 ♂). Beard entirely black. Hypopleuron always with some fine hairs below spiracle. ♂: tergite 5 with a row of discal setae. ♀: *ori* above the lowest pair directed inwards, and margins of interfrontalia convex (as in *fusconota*, Text-fig. 26) . ***D. soror*** sp. n. (p. 273)

## THE *QUADRATA*-GROUP

This small group includes 6 described species (with 2 subspecies) in which the scutellum is broader than long when viewed from above (as in Text-fig. 2) and possesses dark discal setulae that extend on to the lateral surfaces at all points and even invade the ventral surface, fore tibia without a submedian *p* seta, and squamopleuron bare.

The *quadrata*-group possess the following additional characters:

Mentum of proboscis dusted. *Prst acr* setulae 9- to 10-serial. 2 strong *prst dc* setae; 3 or 4 *post dc* setae. *Pra* seta short, about half length of 2nd *npl* seta. Vallar ridge bare. Lower *stpl* seta longer and stronger than anterior one, closer to posterior one than to anterior one. Hypopleuron with numerous dark setulae below spiracle and on metepisternum. Stem-vein bare above. Lower squama bare. Abdominal macrochaetae strong and erect, but not strikingly strong. Male frons slender, at narrowest point eyes separated by less than width of 3rd antennal segment, *ors* hair-like, legs without modifications, 5th sternite normal and lobes without shining posterior prolongations. Broad squat species.

This group is most closely related to the *armata*-group, from which it can be distinguished by the shape of the scutellum (cf. Text-figs. 2 and 3), by the arrangement of the *stpl* setae, and by the secondary male characters. It is clearly a successful group and is found in all parts of the world to which *Dichaetomyia* has spread except for Micronesia and the remoter Pacific islands, Japan, and the Malagasy subregion.

*D. nubiana nubiana* (Bigot) is distributed throughout Africa and the Orient, and the subspecies *aureomarginata* Emden is known from Malaya and Indonesia. *D. quadrata quadrata* (Wiedemann) is Oriental and Papuan in distribution, and the subspecies *monticola* Emden is known from Malaya. *D. peroe* (Walker) is recorded from India and *phaeocnemis* Emden from Malaya. *D. caucasica* Pont is a Palaearctic species, from Azerbaydzhan, and *johannis* Pont is an Australian species.

The distribution in the Indo-Malayan region of *nubiana* and *quadrata* with their subspecies is still not clear, nor have the Melanesian species been worked out. From material I have seen, there are a number of Melanesian subspecies related to *quadrata*, *nubiana* and *johannis*.

## *Dichaetomyia johannis* Pont

(Text-figs. 61, 64, 67)

*Dichaetomyia johannis* Pont, 1967*a* : 622, figs. 2, 5, 18. Holotype ♂, QUEENSLAND: Byfield. In the Division of Entomology, C.S.I.R.O., Canberra.
*Dichaetomyia setulifera* (Stein); Malloch, 1925 : 323 [misidentification].
*Dichaetomyia setulifera* (Stein); Lee, Crust & Sabrosky, 1956 : 334 [misidentification].

Diagnosis: *D. johannis* is a broad bulky species and can be distinguished from the other Australian species with setulose lateral scutellar margins by the shape of the scutellum, which is broader than long (cf. Text-fig. 2), and by the position of the *prsc acr* setae well in front of the transverse level of *prsc dc*; by the simple unmodified mid and hind legs in the male, and by the absence of a submedian *p* seta on fore tibia in the female.

To my previous description of this species (1967*a* : 622 ff.) I would add the following notes:

Male *ori* confined to lower half of frons. Auxiliary propleural seta occasionally absent, auxiliary propleural and prostigmatal setae situated below the strong setae. Tergites 4 and 5 shining, not contrasting.

Material examined. The following additional Australian material has been studied since my previous paper:

NORTHERN TERRITORY: Darwin, 1 ♂, 1 ♀ (*G. F. Hill*), S.A. Mus.; Port Darwin, 2 ♀, iii–iv.1909 (Brunetti Coll.), BMNH; Arnhem Land, Maningrida, 5 m., Malaise-trap, 1 ♀, 18.iii.1961 (*J. L. & M. Gressitt*), BMNH.

QUEENSLAND: Hamilton, Upp-Nth-Pine, 1 ♂, i.1890 (Dept. of Mines and Agriculture), USNM [det. by Malloch as *setulifera*]; Gordonvale, coll ex window, 1 ♂ (*J. F Illingworth*), USNM [det. by Malloch as *setulifera*]; Cairns, coll ex corn, 1 ♂ (*J. F. Illingworth*), USNM [det. by Malloch as *setulifera*]; Eungella, via Mackay, 2,300 ft., 2 ♀, iii.1929 (*F. H. Taylor*), SPHTM; Townsville, 2 ♂ (*F. H. Taylor*), SPHTM; Mt. Molloy, 1 ♂ (*F. H. Taylor*), SPHTM; Watten, 1 ♂, i.1929 (*F. H. Taylor*), SPHTM; Cairns, 1 ♂ (*F. H. Taylor*), SPHTM; Thursday Is., 1 ♂, 5 ♀ (*N. B. Tindale*), 1 ♀, BMNH, 1 ♂, 4 ♀, S.A. Mus.; Gordonvale, 1 ♂, 27.ii.1924 (*G. Bates*), SPHTM; Brisbane, in house, 1 ♀ (*A. J. Turner*), SPHTM; West of Brisbane, Moggill Farm, 25 m., Malaise-trap, 1 ♂, 1–5.ii.1961 (*J. L. Gressitt*), Bishop; Mareeba, Atherton Tableland, 300 m., 1 ♀, 10.iii.1956 (*J. L. Gressitt*), Bishop; Sth. Pine R., 1 ♀, 17.i.1963 (*T. Brooks*), Bishop; Cairns, coll ex corn, 4 ♂, 1 ex (*J. F. Illingworth*), 1 ♂ BMNH, 3 ♂, 1 ex Bishop; Cairns, coll ex cane, 1 ♂ (*J. F. Illingworth*), Bishop; Cairns, coll ex cage, 1 ♂ (*J. F. Illingworth*), Bishop; Gordonvale, coll ex scrub, 2 ♀ (*J. F. Illingworth*), BMNH and Bishop; Cairns, 1 ♀, 1 ex (*J. F. Illingworth*), Bishop; Cairns, coll ex scrub, 1 ♀ (*J. F. Illingworth*), Bishop; Cairns, ex corn, 1 ♂ (*A. P. Dodd*), BMNH; Barron Falls, 1 ♀, 21.v.1958 (*D. K. McAlpine*), Aust. Mus.

Distribution and biology: Australia: Torres Strait (Davan Is.), Northern Territory, Queensland and New South Wales. A common species.

*D. johannis* has been found in a variety of lowland habitats, up to 300 m.: mainly in rain forest, but also in open farming country near rain forest, grassland savannah, savannah woodland, and scrub. It has been collected indoors, and amongst corn and cane. It has been found in buffalo-fly traps and blowfly traps (carrion-baited), and has been collected in Malaise-traps. It is attracted to human and other excrement, and to carrion.

Life-history and immature stages unknown.

Affinities: Only two other species of this group have the mesonotum yellow in ground-colour: *peroe* (Walker) from India (Madras), and *caucasica* Pont from Azerbaydzhan (Talysch). *D. peroe* differs from *johannis* in possessing 3 *post dc* setae; and tergite 4 largely and tergite 5 entirely dark, tergite 5 glossy and contrasting with the shining but shagreened tergite 4. *D. caucasica* is very close to *johannis* but differs in the male by the thinly and inconspicuously whitish dusted mesonotum that lacks any vittae or pattern. *D. quadrata quadrata* (Wiedemann) is close to *johannis* in possessing 4 *post dc* setae and shining but shagreened tergites 4 and 5, but differs by the darkened mesonotum.

Discussion: Malloch's material of *setulifera* (Stein) has been studied and confirms that *johannis* is the species that he misidentified as *setulifera* (Stein).

## THE *ARMATA*-GROUP

This group includes ten Oriental and Australasian species and one subspecies, in which the scutellum is elongated, as broad as long (Text-fig. 3), and possesses dark discal setulae that extend on to the lateral surfaces at all points and even invade the ventral surface.

The *armata*-group possesses the following additional characters:

Mentum of proboscis dusted. *Prst acr* setulae 8- to 9-serial. 2 *prst dc* setae, 3 to 4 *post dc* setae. *Pra* seta short, about half length of 2nd *npl* seta. Vallar ridge bare. Lower *stpl* seta more or less equidistant from the anterior and posterior ones. Hypopleuron with numerous dark setulae below spiracle and on metepisternum. Squamopleuron bare or setulose. Fore tibia with or without a submedian *p* seta in male, always with this seta in female. Stem-vein usually bare above. Lower squama bare. Abdominal macrochaetae strikingly strong and erect on tergites 4 and 5. Male frons broad, at narrowest point broader than width of 3rd antennal segment, *ors* strong, legs frequently with spines, tufts or long hairs, 5th sternite with a shining prolongation to each lateral lobe. Elongate slim species.

This group is most closely related to the *quadrata*-group, from which it can be distinguished by the shape of the scutellum (cf. Text-figs. 3 and 2), by the arrangement of the *stpl* setae, and by the secondary male characters. It contains the most bizarre and striking species of the genus. The epicentre of the group is in Melanesia: two of the described species are Oriental (*scutellaris* Malloch, and *malayana* Malloch ssp. *malayana* s.s. and ssp. *tamil* Emden), three are Australian (*longiseta* Pont, *norrisi* Pont, and *significans* (Walker)), but the other five described species and about seven undescribed species are from New Guinea, the Bismarck Archipelago, the Solomon Islands, and Fiji.

### *Dichaetomyia longiseta* Pont

(Text-figs. 43, 46, 49)

*Dichaetomyia longiseta* Pont, 1967*a* : 626, figs. 10, 11, 16. Holotype ♂, Queensland: 63 miles north of Marlborough. In the Division of Entomology, C.S.I.R.O., Canberra.
*Dichaetomyia rigidiseta* (Stein); Malloch, 1924 : 140 [misidentification].
*Dichaetomyia rigidiseta* (Stein); Malloch, 1925 : 323 [misidentification].
*Dichaetomyia rigidiseta* (Stein); Lee, Crust & Sabrosky, 1956: 332 [misidentification].

Diagnosis: *D. longiseta* is a slender species and can be distinguished from the other Australian species with setulose lateral scutellar margins by the presence of 3 *post dc* setae and the absence of setulae on the post-alar ridge between inner seta and scutellum.

I have found nothing to add to my original description and discussion of variation (1967*a* : 626–631).

Material examined. The following additional Australian material has been studied since my previous paper:

Queensland: Eidsvold, 1 ♂, 4.iv.1924 (*Bancroft*), USNM [det. by Malloch as *rigidiseta*]; Hamilton, Upp-Nth-Pine, 1 ♀, i.1890 (Dept. of Mines and Agriculture), USNM [det. by Malloch as *rigidiseta*]; Roberts Plateau, Macpherson Range, 2,500–4,000 ft., 1 ♀, ii–iii.1929 (*A. J. Turner*), SPHTM; Brisbane, 1 ♂, 17.xi.1914 (*H. Hacker*), Qld. Mus.; West of Brisbane, Moggill Farm, 25 m., Malaise-trap, 1 ♀, 23–27.i.1961 (*J. L. Gressitt*), Bishop; Mt. Edith Forest, 1½ m. off Danbulla Road, 1 ♀, 6.v.1967 (*D. H. Colless*), CSIRO; Back Creek, Palen Creek State Forest, Rathdowney, 1 ♂, 13.xii.1966 (*T. G. Campbell*), CSIRO.

New South Wales: Kuringgai, Sydney, 1 ♀, iv.1925 (Health Dept.), SPHTM; Araluen Valley, 3 ♀, 12.iii.1967 (*Z. Liepa*), 1 ♀ BM, 2 ♀ CSIRO; Ulladulla, 1 ♂ (*F. H. Taylor*), SPHTM; Blue Mountains, Springwood, 1 ♀, 10.i.1956 (*D. K. McAlpine*), Aust. Mus.; 30 miles S. of Singleton, Putty Road, 1 ♂, 1 ♀, 6.ii.1968 (*D. H. Colless*), CSIRO.

Distribution and biology: Australia: Northern Territory, Queensland, New South Wales. An uncommon species.

This is primarily a species of rain forest and wet sclerophyll forest, from sea-level up to 1,300 m., but it has also been found among the coarse grasses of savannah woodland and in stunted scrub near the sea-shore. It has been trapped near carrion, and collected in Malaise-traps.

Life-history and immature stages unknown.

Variation: The variation in leg chaetotaxy in this species was discussed and tabulated in my previous paper (1967*a* : 630). Study of further material has convinced me that there is in fact only one species involved here, as originally suggested, and the variation observed in this further series of males is summarized in Table 1.

Affinities: As previously mentioned (Pont, 1967*a* : 632), *longiseta* is closely related to *rigidiseta* (Stein) from New Guinea, which also has 3 *post dc* setae and lacks setulae on the ridge between inner post-alar seta and scutellum. *D. rigidiseta* has, in the male sex, the *av* and *pv* setae on hind femur less numerous, more robust and not at all

TABLE I

Variation in some characters in males of *Dichaetomyia longiseta* Pont

| Locality and number of specimens | Fore tibia: submedian *p* seta | Mid femur: *pv* setae | Hind femur: start of *av* row | Hind femur: start of *pv* row | Hind tibia: *av* setae |
|---|---|---|---|---|---|
| Ulladulla (1) | Fore legs missing | 2 strong, 1 moderate | Basal $\frac{2}{5}$ to $\frac{1}{3}$ | Apical $\frac{1}{2}$ | 1 |
| Eidsvold (1) | 0 | 1 strong, 3 moderate | Basal $\frac{1}{4}$ | Apical $\frac{1}{2}$ | 2 |
| Brisbane (1) | 0 (only one foreleg) | 4 moderate | Basal $\frac{2}{5}$ | Apical $\frac{1}{3}$ | 1–2 |
| Rathdowney (1) | 1 | 1 strong, 1–2 moderate | Basal $\frac{1}{4}$ | Apical $\frac{1}{2}$ | 2 |
| Singleton (1) | 0 | 1 strong, 2–3 moderate | Basal $\frac{1}{4}$ | Apical $\frac{2}{5}$ | 1–2 |

curled, nowhere presenting a tuft-like appearance; and in the female sex, a complete row of *pv* setae on fore femur.

Discussion: I have studied some of the material identified as *rigidiseta* (Stein) by Malloch (1924 : 140, and 1925 : 323), and other material bearing Malloch's determination label, and can confirm that this is the species misidentified by Malloch as *rigidiseta*.

## ***Dichaetomyia norrisi*** Pont

(Text-figs. 45, 48, 51)

*Dichaetomyia norrisi* Pont, 1967*a* : 636, figs. 1, 3, 4, 6, 8, 12, 15, 17. Holotype ♂, QUEENSLAND: 63 miles north of Marlborough. In the Division of Entomology, C.S.I.R.O., Canberra.
*Dichaetomyia armata* (Stein); Malloch, 1924 : 140 [misidentification].
*Dichaetomyia armata* (Stein); Malloch, 1925 : 323 [misidentification].
*Dichaetomyia armata* (Stein); Lee, Crust & Sabrosky, 1956 : 307 [misidentification].

Diagnosis: *D. norrisi* is a slender species and can be distinguished from the other Australian species with setulose lateral scutellar margins, 4 *post dc* setae and the scutellum shaped as in Text-fig. 3 by the presence of a submedian *p* seta on fore tibia in the male sex and by the absence of several strong erect marginal setae on tergite 4 in the female. See Pont (1967*a* : figs. 8, 12 and 15 [see correction below under " Discussion "]).

I have found nothing to add to my original description of this species (1967*a* : 636–639).

Material examined. The following additional Australian material has been studied since my previous paper:

QUEENSLAND: Lake Barrine, 1 ♀, 25.ix.1937 (*A. J. Turner*), Vict. Mus.; Brisbane, 1 ♀, 30.x.1921 (*H. Hacker*), Vict. Mus.; Mt. Glorious, 2 ♂, 3 ♀, 13.ii.1961 (*L. & M. Gressitt*), 1 ♀ BMNH, 2 ♂, 2 ♀ Bishop; Mt. Glorious, Malaise-trap, 2 ♀, 5–8.ii.1961 (*L. & M. Gressitt*), BMNH and Bishop; West of Brisbane, Moggill Farm, 25 m., Malaise-trap, 5 ♂, 2 ♀, 27.i–1.ii.1961, 2 ♂, 1 ♀, 1–5.ii.1961, and 1 ♀, 23–27.i.1961 (*J. L. Gressitt*), 3 ♂, 1 ♀, BMNH, 4 ♂, 3 ♀ Bishop; Yungaburra, 850 m., Ath. Tbld., Malaise-trap, 1 ♀, 9–12.v.1961 (*J. L. & M. Gressitt*), Bishop; Eidsvold, 4 ♂, 4.iv.1924 (*Bancroft*), SPHTM; Brisbane, in house, 2 ♀ (*A. J. Turner*), SPHTM; Brisbane, 1 ♀ (*A. J. Turner*), SPHTM; Brisbane, 1 ♀, 26.x.1908 (*H. Tryon*), Qld. Dept. Pr. Ind.; Brisbane, 1 ♀, 17.iii.1935, Qld. Dept. Pr. Ind.

New South Wales: Kuringai Chase, W/A Trapping, 2 ♀, 12–15.viii and 23–26.ix.1963 (*J. H. Ardley*), SPHTM; Glenreagh, 1 ♀, 1.ii.1923 (Health Dept.), USNM; Coramba-Dorrigo road, 1,000 ft., 1 ♂, 31.i.1923 (Health Dept.), USNM; National Park, 1 ♀, 4.vi.1955 (*D. K. McAlpine*), Aust. Mus.; Bronte, near Sydney, 1 ♀, v.1955 (*D. K. McAlpine*), Aust. Mus.

Distribution and biology: Australia: Queensland and New South Wales. The commonest and most generally distributed Australian species of the *armata*-group.

This species occurs from sea-level up to 850 m., and is less restricted to rain forest than are *significans* and *longiseta*: in addition to rain forest, it has been collected in dry forest, savannah woodland, open farm land and on a sandy lawn. It has been trapped in blowfly traps over carrion and in Western Australian fly traps, and has been found indoors. It has been caught in Malaise-traps.

Life-history and immature stages unknown.

Variation: Some males have been seen in which there is a second fine submedian *p* seta on fore tibia. One female, from Mt. Glorious, has a pair of median marginal setae on tergite 4 but otherwise has the characters of *norrisi*. On average, *norrisi* is a smaller fly than *significans*, but the specimens from Mt. Glorious are larger than is usual (length of wing 8·0 mm.).

Affinities: *D. norrisi* is most closely related to *significans* from which it can be distinguished by the characters given in the key. The configuration of the male legs is unique in the *armata*-group, and it is the only species in the *armata*-group lacking marginal setae on tergite 4 in the female sex.

Discussion: I have studied some of the material identified as *armata* (Stein) by Malloch (1924 : 140, and 1925 : 323). Apart from the two males of *significans* (see below, p. 217), Malloch's material and published notes refer to *norrisi*.

Figure 14 in my previous paper (1967*a* : 633) should bear the number 15 and not 14; of the two femora illustrated, the upper one is that of *norrisi* and the lower one that of *significans*.

### ***Dichaetomyia significans*** (Walker)

(Text-figs. 3, 44, 47, 50)

*Aricia significans* Walker, 1859 : 107. Lectotype ♂, Aru Island. In the British Museum (Natural History), London. [Examined.] [Designation by Pont, 1966*a* : 96].

*Spilogaster helomyzina* Stein, 1900*a* : 384. Holotype ♀, New Guinea: Waikunina. In the Museo Civico di Storia Naturale, Genoa. [Examined.] **syn. n.**

*Spilogaster significans* (Walker) de Meijere, 1906 : 90.

*Mydaea spinipes* Stein, 1918 : 184. Neotype ♂, Aru Island. In the British Museum (Natural History), London. [See designation below.] **syn. n.**

*Dichaetomyia armata* (Stein); Malloch, 1929*a* : 405 [misidentification].
*Mydaea spinipes* Stein; Emden, 1965 : 492.
*Mydaea spinipes* Stein; Pont, 1966*a* : 91.
*Dichaetomyia significans* (Walker) Pont, 1966*a* : 96.
*Dichaetomyia helomyzina* (Stein) Pont, 1966*b* : 384.
*Dichaetomyia significans* (Walker); Pont, 1967*a* : 632, figs. 7, 13, 14.

*Neotype designation for* spinipes *Stein.* The names *contraria* Walker, *significans* Walker and *spinipes* Stein have previously been discussed in detail (Pont, 1966*a*). It is not necessary to repeat the facts here, but a re-examination of the problem has led to the following conclusions.

The species that Stein described in 1901 (p. 193) standing under the name *contraria* in the BMNH can only be one species, namely that now known as *Dichaetomyia significans* (Walker). His description fits this species in all details. My examination of all the relevant Wallace material also shews that *significans* is the only species that fits Stein's description. Stein doubtfully assigned these specimens under " *contraria* " to his *rigidiseta*, noting that they possessed 4 *post dc* setae whereas *rigidiseta* has but 3 such setae. He evidently decided later that this course was in error, and in 1918 (p. 184) decided to name this species as " *spinipes* nov. sp. (*contraria* WLK, coll.) ", satisfied that the key characters and the description of 1901 were sufficient validation of the name. His references to the hind femur in 1918, conflicting with the 1901 statements, must be due to some kind of error; apart from this, *significans* runs perfectly to *spinipes* in his key. *Spinipes* is in the section of the key with 4 *post dc* setae and no *p* seta on fore tibia. It cannot be *rigidiseta*, which is included in the section of the key with 3 *post dc* setae and a *p* seta on fore tibia Nor can it be a species of *Eumyiospila* Malloch, in which it has been placed by later authors, since Stein includes the species of this genus in a later part of the key (p. 185). It can only be *significans*, which fits his description (1901 : 193) and the key data (1918 : 179–184) except that no mention is made of the hind femoral spine in 1918. I am satisfied that there can be no other species involved here but for *significans*, and also that it was Stein's intention to name as *spinipes* the species now known as *significans*. I have previously stated my belief that Stein was in fact looking at the syntypes of *significans*, erroneously or for whatever reason placed under the series of *contraria* syntypes in the BMNH. This cannot be proved, and I am therefore forced to consider the type-series of " *spinipes* " as " lost " in the sense that it can no longer be located beyond any reasonable doubt.

I am therefore designating the male lectotype of *significans* as the male NEOTYPE of *spinipes*, and the name *spinipes* thus becomes a junior objective synonym of *significans*.

Diagnosis: *D. significans* is a slender species and can be distinguished from the other Australian species with setulose lateral scutellar margins, 4 *post dc* setae and the scutellum shaped as in Text-fig. 3 by the absence of a submedian *p* seta on fore tibia in the male sex and by the presence of several strong erect marginal setae on tergite 4 in the female. See Pont (1967*a* : figs. 7, 13 and 14 [see correction below, under " Discussion "]).

I have found nothing to add to my redescription of this species (1967*a* : 632–636).

Material examined. Lectotype ♂ and paralectotype ♀ of *significans*, and neotype ♂ of *spinipes*, ARU ISLAND (*A. R. Wallace*), BMNH.

Holotype ♀ of *helomyzina*, NEW GUINEA: Waikunina, vi.1890 (*L. Loria*), Genoa. The following material has been studied since my previous paper:

QUEENSLAND: Kuranda, 350 m., rain forest, 1 ♀, 6.v.1961 (*L. & M. Gressitt*), Bishop; Cape York, Top Rocky Yard, Rocky R., N.E. of Coen, 150 m., 1 ♀, 30.iv.1961 (*L. & M. Gressitt*), Bishop; Cairns, 1 ♀, 12.v.1938 (*F. H. Taylor*), SPHTM; Kuranda, 1 ♀ (*F. P. Dodd*), CSIRO; Mt. Molloy, 1 ♂ (*F. H. Taylor*), SPHTM; Palm Is., 1 ♂ (*F. H. Taylor*), SPHTM; Claudie River near Mt. Lamond, 1 ♂, 3.vi.1966 (*D. K. McAlpine*), Aust. Mus.; Mulgrave River 4 miles W. of Gordonvale, 1 ♀, 21.v.1966 (*D. K. McAlpine*), Aust. Mus.; Carmila, 1 ♀, 13.v.1927, Qld. Dept. Pr. Ind.

BURU Is.: Station 5, 1 ♀, iv.1921 (*L. J. Toxopeus*), Amsterdam [det. by Malloch as *armata*].

MISOOL Is.: 1 ♀ (*A. R. Wallace*), BMNH.

WEST IRIAN: Merauke, 1 ♀, 1904–1905 (Nieuw. Guinea Expeditie), Amsterdam; Manokwari, 1 ♂, 2.v.1903, Amsterdam [det. by de Meijere as ?*significans*]; Sentani, 90 + m., 2 ♂, 15 & 16.vi.1959 (*T. C. Maa*), Bishop; Vogelkop, Manokwari, 75 m., 1 ♂, 21.vii.1957 (*D. E. Hardy*), BMNH; Hollandia area, W. Sentani, Cyclops Mts., 150–250 m., 1 ♂, 17.vi.1959 (*J. L. Gressitt*), Bishop; Nabire, S. Geelvink Bay, 1–20 m., Malaise-trap, 1 ♂, 8.vii.1962 (*J. L. Gressitt & J. Sedlacek*), BMNH; Nabire, S. Geelvink Bay, 0–30 m., Malaise-trap, 2 ♀, 2–9.vii.1962 (*J. L. Gressitt*), Bishop; Hollandia area, W. Sentani, Cyclops Mts., 90 m., Malaise-trap, 1 ♂, 22.vi.1959 (*Gressitt & Maa*), Bishop; Vogelkop, Fak Fak, S. coast of Bomberai, 10–100 m., 1 ♀, 11.vi.1959 (*T. C. Maa*), Bishop; Lake Sentani, 50 m., 1 ♀, 12.vii.1957 (*D. E. Hardy*), Bishop; Biak Island, Mangrowawa, 50–100 m., 1 ♂, 29.v.1959 (*T. C. Maa*), Bishop; Baie du Geelvink, 1 ♂, 1878 (*Raffray et Maindron*), Paris.

N.E. NEW GUINEA: Nineia, Morobe District, 1,500 ft., 1 ♂, v. 1960 (*B. McMillan*), BMNH; Morobe District, Wau, 3,500–4,000 ft., 2 ♀, 14–23.v.1965 (*R. W. Crosskey*), BMNH; Wewak, 1 ♀ (*F. H. Taylor*), SPHTM; Wewak, 1 ♂, 1 ♀, SPHTM; Angoram, Sepik River, 1 ♀, x.1959 (*R. Pullen*), CSIRO; Lower Sepik River, 1 ♀, x.1959 (*R. Pullen*), CSIRO; May R., Patrol Station, 100 m., fresh dung, 1 ♂, 2.vi.1963 (*R. Straatman*), Bishop; Minj, Western Highlands, 1 ♂, 1 ♀, 8–13.ix.1959 (*T. C. Maa*), ♂ BMNH, ♀ Bishop; Wampit V. near Gurakor Village, 950 m., near Wau, 1 ♀, 7.vii.1957 (*D. E. Hardy*), BMNH; Wau, Morobe District, 1,200 m., 1 ♀, 11–14.ix.1961, and light-trap, 1 ♀, 21.vii.1961 (*J. Sedlacek*), Bishop.

PAPUA: Central District, Brown River, 1 ♂, 7.v.1965 (*R. W. Crosskey*), BMNH; Central District, Kapogere, 60 m. S.E. of Port Moresby, 2 ♂, 1 ♀, 3.v.1965, and 1 ♂, 1 ♀, 2.v.1965 (*R. W. Crosskey*), BMNH; Central District, Gaile Forest, 28 m. S.E. of Port Moresby, 1 ♀, 5.v.1965 (*R. W. Crosskey*), BMNH; Vailala River, 1 ♀, ii.1922 (*G. H. Murray*), CSIRO; Aroana Estate, Aroa River, 1 ♂, 7.xii.1967 (*D. K. McAlpine*), Aust. Mus.; Eastern Highlands, South Okapa, Okasa, 4,560 ft., 1 ♂, 25.vi.1964 (*R. Hornabrook*), CSIRO; Daradae Plain, 500 m., 80 km. N. of Port Moresby, secondary forest, 1 ♂, 5.ix.1959, and 1 ♂, 4.ix.1959 (*T. C. Maa*), Bishop; Western District, Oriomo Govt. Sta., Malaise-trap, 2 ♀, 26–28.x.1960 (*J. L. Gressitt*), BMNH and Bishop; Popondetta, 60 m., Malaise-trap, 1 ♀, 2.ix.1963 (*J. Sedlacek*), Bishop.

Bismarck Archipelago: Manus Island, Lorengau, 1–75 m., 1 ♀, 28.vi.1959 (*J. L. Gressitt*), Bishop; Mussau Island, Talumalaus, Malaise-traps, 1 ♀, 21.i.1962, and 1 ♀, 1.ii.1962 (Noona Dan Exped. 1961–62), BMNH and Copenhagen; New Britain, Keravat, 135 m., 2 ♀, 20–25.xi.1959 (*T. C. Maa*), BMNH and Bishop; New Britain, Vaisisi, 1 ♀, 9.vii.1962 (Noona Dan Exped. 1961–2), Copenhagen; New Britain, Valoka, 1 ♀, 7.vii.1962, and 1 ♀, 10.vii.1962 (Noona Dan Exped. 1961–62), Copenhagen.

Distribution and biology: Australia: Queensland. Buru Is., Aru Is., Misoöl Is., New Guinea (West Irian, N.E. New Guinea, Papua), and Bismarck Archipelago (New Britain, Manus and Mussau Is.). An uncommon species in Australia.

This species occurs up to 350 m. in Australia, and is usually restricted to rain forest. It has been caught at a dairy farm, near rain forest, in a buffalo-fly trap.

In New Guinea it occurs from sea-level up to 1,520 m.

Life-history and immature stages unknown.

Variation: Australian specimens of this species are very constant in structure, but some variation has been noted in non-Australian material. One male (Biak Island) has a submedian *p* seta on each fore tibia, but is otherwise identical with *significans*. New Guinea females often have the ventral setulae in the basal half of hind femur very reduced or vestigial, and one female (Manus Is.: Lorengau) lacks them completely.

Affinities: *D. significans* is most closely related to *norrisi* from which it can be distinguished by the characters given in the key (p. 201). In New Guinea and the Bismarck Archipelago it is the only species of the *armata*-group with a pale mesonotum and a hind femoral spine in the male, and it is replaced in the Solomon Islands by some undescribed species.

Discussion: Although the characters ascribed by Malloch (1924 : 140, and 1925 : 323) to *armata* (Stein); Malloch in his key and notes are those of the species I have described as *norrisi*, I have seen two Australian males of *significans* identified as *armata* by Malloch.

I have seen the male doubtfully identified by de Meijere as *significans* (1906 : 90) and can confirm that this identification is correct. I have also seen the female from Buru identified by Malloch as *armata* (1929*a* : 405) and find that it is *significans*.

Figure 15 in my previous paper (1967*a* : 633) should bear the number 14 and not 15: of the two femora illustrated, the upper one is that of *norrisi* and the lower one that of *significans*.

## The *IMPAR*-Group

This small group includes six Oriental and Australasian species in which there are 4 *post dc* setae, the first of which is very reduced and only about twice as long as a ground-setula; consequently the first strong *post dc* seta (the true second) is closer to the *dc* behind it than to suture or, occasionally, midway between this *dc* and the suture; and, at the same time, squamopleuron bare and fore tibia without a submedian *p* seta.

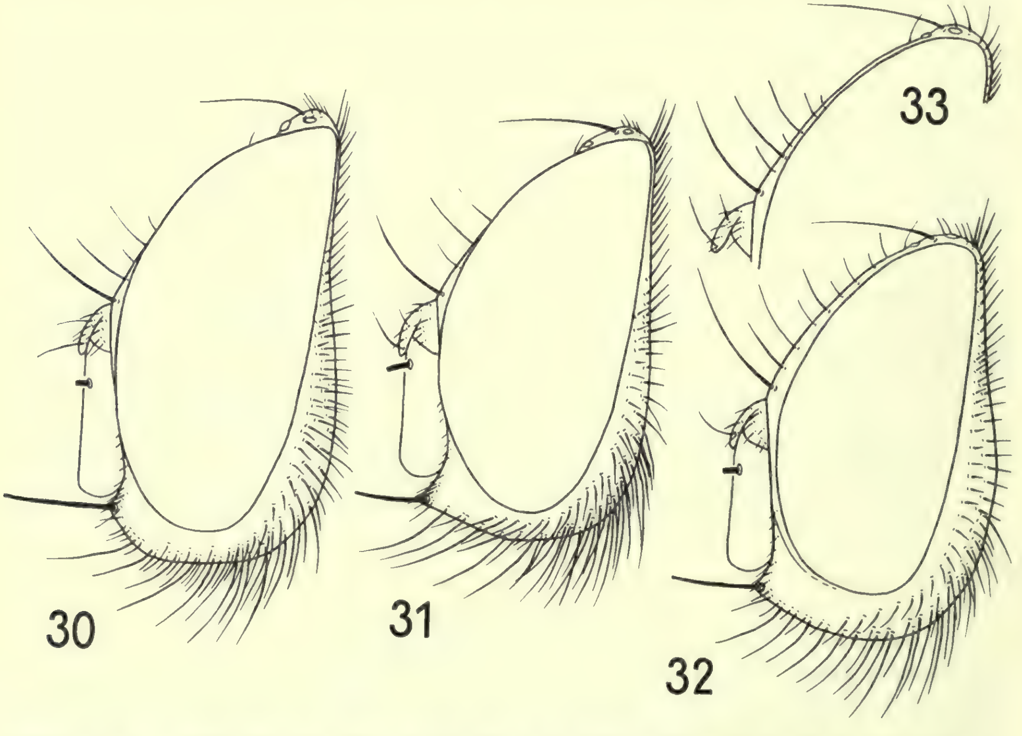
The *impar*-group possess the following additional characters:

Hypopleuron bare on beret and below spiracle, with hairs on metepisternum. Disc of scutellum with a few (up to six) setulae descending just below the level of the strong setae, otherwise bare laterally and ventrally. *Pra* seta well-developed but short, half length of 2nd *npl* seta. Stem-vein bare above. 2 *prst dc* setae. *Prst acr* setulae 5- to 7-serial. Vallar ridge bare. Lower squama bare on disc. Mentum of proboscis dusted.

The group contains only three described species, and the three new species that are described below. *D. parimpar* is confined to Australia; *D. breviseta* is distributed from Australia, through southern New Guinea and New Britain to the Solomon Islands, as far east as Malaita Is.; *D. parviseta* is confined to the extreme eastern islands of the Solomon group, Ugi and San Cristobal. These three Australasian species are described below, and *parviseta* is described as new in this paper because it is so closely related to the other two that its relationship and distinctive characters are best emphasized comparatively by reference to the other species.

The other three species in this group differ from *parimpar*, *breviseta* and *parviseta* as follows:

*D. impar* (Stein), known only from the syntypic series from Java, resembles *breviseta* most closely in having mesonotum yellow, and abdomen with tergites 4 and



FIGS. 30–33. *Dichaetomyia impar* group, head, ♂, lateral view, of: 30, *D. parimpar* sp. n. (holotype); 31, *D. parviseta* sp. n. (holotype); 32, *D. breviseta* sp. n. (♀, Yeppoon 10.v.55, paratype); 33, *D. breviseta*, frons only (holotype).

5 infuscated but basal tergites yellow. Females differ from *breviseta* by the absence of *av* and *pv* setae or setulae in the basal half of mid and hind femora, but it is anticipated that the male of *impar*, when discovered, will differ rather more significantly from that of *breviseta*.

*D. canivitta* (Walker), known only from the female holotype from Aru Island, has the mesonotum largely infuscated, with a conspicuous broad light grey dusted median vitta from neck to well behind suture; mainly yellow pteropleural setulae; brown femora and tibiae; creamy white squamae; hind femur with some strong *av* setae in basal half.

*D. pallens* (Stein), from India and Ceylon, has the mesonotum except for humeri, pleura and scutellum dark in ground-colour and densely yellowish grey dusted, the mesonotum with a pair of thinly dusted paramedian vittae from neck to 3rd *post dc* seta; abdomen partly dark in ground-colour and densely yellowish grey dusted; hind femur of male with a complete row of *av* setae.

## ***Dichaetomyia impar*** (Stein)

*Mydaea impar* Stein, 1909 : 229. Lectotype ♀, JAVA: Batavia, Moeara Antjol. In the Zoölogisch Museum der Universiteit van Amsterdam. [See designation below.]

Lectotype designation: Stein described this species from two females, one of which is now in the Zoölogisch Museum der Universiteit van Amsterdam and the other in the Zoologisches Museum der Humboldt-Universität zu Berlin. I have been able to study both syntypes. Both are in excellent condition, and each bears the data " E. Jacobson, Moeara Antjol, Batavia, Dec. 1907 " and Stein's determination label. I have labelled, and designate herewith, the Amsterdam female as LECTOTYPE and the Berlin female as paralectotype.

Malloch (1925 : 327) has recorded *impar* from Australia. I have studied a number of Australian specimens so identified by him, and find that they are referable to *parimpar* sp.n. True *impar* is in fact most closely related to *breviseta* sp. n. and differs principally by the absence of *av* and *pv* setae or setulae in the basal half of mid and hind femora. *D. impar* is still known only from the type-series from Java.

## ***Dichaetomyia parimpar*** sp. n.

(Text-figs. 30, 34, 35, 36, 37, 52, 55, 58)

*Dichaetomyia impar* (Stein); Malloch, 1925 : 327 [misidentification].
*Dichaetomyia impar* (Stein); Lee, Crust & Sabrosky, 1956 : 321 [misidentification].

Diagnosis: *D. parimpar* can be distinguished from other species of the *impar*-group with a yellow mesonotum by the ground-colour of the abdomen, in which tergites 1 + 2 and 3 may be yellow or black fasciate or entirely black but in which tergites 4 and 5 are always yellow, and by the weaker abdominal macrochaetae. In addition the male can be distinguished by the white-dusted *prst* markings on mesonotum and by the narrow frons, at narrowest point less than diameter of anterior ocellus, with interfrontalia completely obsolete on median third or more. The female can be reliably separated from that of *breviseta* by the abdominal characters, but is otherwise almost indistinguishable.

♂. *Head:* Profile as in Text-fig. 30. Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite weak, only half length of anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row, most of which are black. Parafrontalia, parafacialia and face silvery white pruinose; genae black in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender throughout, at lunula equal to a little over diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula. 4–5 pairs of rather weak inclinate *ori* on lower two-fifths of frons, the upper pair hair-like; 1–2 pairs of hair-like reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow; 3rd segment weakly to conspicuously infuscated beyond arista, white pruinose. 3rd segment three times as long as broad, in frontal view reaching epistoma. Arista with long regular plumosity, the longest of which almost equals length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia largely invisible; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin almost equal to width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Beard black, with some golden setae. Facial ridges with short hairs ascending to midway level of 3rd antennal segment. Mentum of proboscis light brown to brown. Palpi yellow, brown in basal third to half, entirely yellow in some males; compressed, quite slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Scutellum undusted, pleura virtually undusted. Anterior spiracle pale yellow. Mesonotum with the ground-setulae rather short and sparse, except those between the *dc*, black unless otherwise stated; some pleural ground-setulae paler towards tips. *Acr* 0 + 1, the single (*prsc*) pair well developed, slightly closer to each other than to the *dc*. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity with or without a few golden hairs. Supra-squamal ridge bare. Prosternum golden setulose, rarely with a few brown setulae in front. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with an auxiliary seta below; the former surrounded by few, the latter by numerous, entirely or predominantly dark setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with setulae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on sub-alar ridge confined to anterior part, a few descending down to sternopleural and hypopleural margins and becoming paler towards tips, the lowest ones apparently dark yellow or brown at bases but none wholly yellow. *Stpl* 1 + 2, the lower one usually weaker than anterior one, and only slightly closer to posterior one than to anterior one. Hypopleuron with the hairs on metepisternum pale, rarely brown. Metathoracic spiracle small, subtriangular, with a row of black setulae on lower margin. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically and laterally. *Legs:* Yellow; tarsi yellow, 5th and rarely 4th segments brown. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur with or without a few fine *pv* setae in basal third, none of which is as long as femoral depth, otherwise without *av* or *pv* setae; 1 *a* and 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with 3–5 longer *av* and *pv* setulae in basal third, and with 4–5 preapical *av* setae, the basal ones may be so reduced as to be almost absent, or may be well developed and numerous, in some cases almost forming a complete row on the *av* surface; *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 *ad* and 1 (rarely 2) *av* seta slightly apicad of it; some of the *pd* ground-setulae more erect in apical half; *ad* and *d* preapical setae subequal, and subequal to tibial depth. *Wings:* Yellowish tinged. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein with a few dark hairs below. Small cross-vein placed below or slightly apicad of the point where vein 1 enters costa. Hind cross-vein oblique, bowed to weakly sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base and just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae rather deep yellow, margins of upper one concolourous with disc, margins of lower one creamy or concolourous, fringes pale. Knob of halteres yellow. *Abdomen:* Sternites yellow. In posterior view, tergites hardly dulled by dust, subshining; finely shagreened and not glossy, this being particularly noticeable on the black areas. *Genitalia:* Text-figs. 52, 55, 58. *Measurements:* Length of body, 7·0–7·5 mm. Length of wing, 6·5–7·0 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle slightly less than an eye-width, broadening gradually towards lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, almost equal to 2nd *prst dc* seta, directed forwards and slightly outwards. The incurved *vti* not much longer than the outcurved *vte*; *pvt* weak, outcurved. Parafrontalia silvery white pruinose below, the pruinosity thinner and then greyer or even yellowish grey in upper half, subshining black alongside ocellar tubercle; parafacialia whitish grey, face more grey, genae brownish grey. Interfrontalia black in ground-colour, reddish in immature specimens; viewed from below, wholly brownish grey pruinose; frontal triangle visible as a subshining black streak extending ⅗ distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle almost twice diameter of anterior ocellus, at lunula as broad as width of 3rd antennal segment. Interfrontalia with the margins weakly convex, broadest at middle of frons, at lunula broader than a parafrontale, bare. 4–5 pairs of well developed inclinate *ori* on lower two-thirds of frons, with a few interstitials, the lowest pair very strong; 2 pairs of reclinate *ors*, the upper stronger than the lower and placed closer to it than to *vti*; parafrontalia otherwise with short proclinate setulae on whole length. Parafacialia broader, opposite insertion of arista slightly broader than diameter of anterior ocellus, hardly tapering below. *Thorax:* Viewed from above and behind, mesonotum and scutellum undusted except for very faint traces of the white-dusted vittae of the male at neck. Lower *stpl* slightly weaker than the anterior one. Scutellum with 4–6 setulae below the level of the strong setae. *Legs:* Mid femur with 3–4 *d-p* preapical setae. Hind femur with 2–5 preapical *av* setae. *Measurements:* Length of body, 6·5–7·5 mm. Length of wing, 6·0–7·0 mm.

Holotype ♂. QUEENSLAND: Mount Spec, 2,900 feet, 22.iv.1955 (*K. R. Norris*), CSIRO.

Paratypes, 42 ♂, 56 ♀, QUEENSLAND: Mount Spec, 2,900 ft., 4 ♂, 5 ♀, 22.iv.1955 (*K. R. Norris*), 2 ♂, 1 ♀ BMNH, 2 ♂, 4 ♀ CSIRO; Mount Spec, 2,900 ft., 1 ♂, 6 ♀, 22.iv.1955 (*K. R. Norris & I. F. B. Common*), 2 ♀ BMNH, 1 ♂, 4 ♀ CSIRO; 4 miles S. of Atherton, 1 ♂, 2.v.1955 (*K. R. Norris*), CSIRO; 1 mile E. of Kuranda, 1 ♂, 19.iv.1964 (*I. F. B. Common & M. S. Upton*), BMNH; 3 miles N. of Kuranda, 1 ♀, 24.iv.1955 (*K. R. Norris*), CSIRO; Daintree, at light, 8 p.m., 1 ♂, 3.ix.1959 (*R. Laird*), CSIRO; Coomera River, Lamington Nat. Park, 1,200 ft., 1 ♂, 28.v.1966 (*Z. Liepa*), CSIRO; Highvale, 14 miles N.W. of Brisbane, 1 ♂, 27.xii.1959 (*R. Straatman*), CSIRO; 12 miles S. of Ravenshoe, 8 ♀, 4.v.1955 (*K. R. Norris*), 3 BMNH, 5 CSIRO; Byfield, 1 ♀, 10.v.1955 (*Common & Norris*), CSIRO; 14 miles S.W. of Sarina, 1 ♀, 8.v.1955 (*K. R. Norris*), CSIRO; Palm Is., 1 ♀, 20.xii.1930–6.i.1931 (*I. M. Mackerras*), CSIRO; Mt. Bartle Frere, east base, 80 ft., 2 ♀, 24 and 25.iv.1955 (*K. R. Norris*), CSIRO; 1 ♀ (*Bancroft*), BMNH [det. by Malloch as *impar*]; Tambourine Mts., 1 ♀, 18–25.v.1935 (*R. E. Turner*), BMNH; Kuranda, 1 ♀ (*F. P. Dodd*), BMNH; Kuranda, 3 ♂, ix.1910 (Brunetti Coll.), BMNH; Kuranda, 1 ♂, x.1910 (Brunetti Coll.), BMNH; Mt. Tambourine, 1 ♂ (*A. M. Lea*), S.A. Mus.; Mt. Glorious, 2 ♀, 13.ii.1961 (*L. & M. Gressitt*), BMNH and Bishop; Mt. Glorious, 2 ♂, 1 ♀, Malaise-trap, 5–8.ii.1961 (*J. L. & M. Gressitt*), Bishop; Mt. Glorious, sclerophyll forest, 1 ♀, 16–20.ii.1961 (*L. & M. Gressitt*), Bishop; Mt. Glorious, 600 m., rain forest, 1 ♀, 28.ii–6.iii.1961 (*L. & M. Gressitt*), BMNH; Mt. Glorious, rain forest, 1 ♂, 1 ♀, 13–16.ii.1961 (*L. & M. Gressitt*), ♂ BMNH, ♀ Bishop; Hamilton, Upp-Nth-Pine, 1 ♂, xii.1889 (Dept. of Mines and Agriculture), USNM [det. by Malloch as *impar*]; Malanda, 1 ♀ (*G. F. Hill*), USNM [det. by Malloch as *impar*]; Eungella, via Mackay, 2,300 ft., 4 ♂, 2 ♀, iii.1929 (*F. H. Taylor*), 1 ♂ USNM, 3 ♂, 2 ♀ SPHTM [det. by Malloch as *impar*]; Roberts Plateau, Macpherson Range, 2,500–4,000 ft., 1 ♀, ii–iii.1929 (*J. Turner*), SPHTM; Canungra, 1 ♀, 20.ii.1955 (*Standfast*), CSIRO; Mossman Gorge, 1 ♂, 24.iv.1967 (*D. H. Colless*), CSIRO; 5–8 m. Mt. Lewis Road off Mossman-Mt. Mulloy Road, 1 ♂, 1 ♀, 22.iv.1967 (*D. H. Colless*), CSIRO; Whitfield Range Forest Reserve, Cairns, 1 ♂, 19.iv.1967 (*D. H. Colless*), CSIRO; Kuranda, 1 ♂ (*F. P. Dodd*), SPHTM; Brisbane, in house, 2 ♀ (*A. J. Turner*), SPHTM; Brisbane, in house, 1 ♀, xii.1928 (*A. J. Turner*), SPHTM; Mount Spec, 2 ♂, 2 ♀, 1.iv.1965 (*D. E. Havenstein*), CSIRO; Mulgrave River, 4 miles W. of Gordonvale, 1 ♀, 2.i.1967 (*D. K. McAlpine*), Aust. Mus.; Goondi Hill, Innisfail, 1 ♂, 7.x.1955 (*R. Dobson*), Aust. Mus.

NEW SOUTH WALES: Manly Reservoir, Sydney, 1 ♂, 24.iv.1961 (*D. H. Colless*), CSIRO; Kangaroo Valley, 2 ♂, 2 ♀, 23.iii.1961 (*D. H. Colless*), ♂ ♀ BMNH, ♂ ♀ CSIRO; Palm Creek, Royal National Park, 1 ♂, 2 ♀, 2.i.1962, CSIRO; Clyde Mt., east slope, 1 ♂, 5.iv.1960 (*Z. Liepa*), BMNH; Killara, 1 ♂, 27.i.1936 (*M. F. Day*), CSIRO; Dorrigo, 1 ♂, 1 ♀ (*W. Heron*), S.A. Mus.; Kuringai Chase, 1 ♀, 23–26.ix.1963 (*J. H. Ardley*), SPHTM; Upper Allyn, near Eccleston, 1 ♂, 4.v.1967 (*D. K. McAlpine*), Aust. Mus.; Springwood, Blue Mountains, larva in rotting wood, 30.i.1956, adult em. 11.ii.1956, 1 ♂ with puparium (*D. K. McAlpine*), Aust. Mus.; N. Bondi, 1 ♀, 4.vi.1962 (*K. Kota*), Aust. Mus.; Mt. Gibraltar, National Park, eastern scarp, *c.* 3,000 ft., 1 ♀, 24.ii.1965 (*D. K. McAlpine*), Aust. Mus.; Minnamurra Falls, 1 ♂, 29.i.1968 (*Z. Liepa*), CSIRO; Dorrigo Nat. Park, 1 ♂, 1 ♀, 12.ii.1968 (*D. H. Colless*), ♂ BMNH, ♀ CSIRO; Upper Allyn River, 1 ♂, 1 ♀, 14.ii.1968 (*D. H. Colless*), CSIRO.

Not paratypes, QUEENSLAND: Atherton, 1 ♂, 6.x.1959 (*G. Ettershank*), Qld. Dept. Pr. Ind. NEW SOUTH WALES: Sydney, 1 ♀, 6.xi.1922 (*Health Dept.*), SPHTM.

Distribution and biology: Australia: Queensland and New South Wales. A common species.

This species is most common in rain, sclerophyll and eucalyptus forest, and occurs from sea-level up to about 1,200 m. It has also been found in dry forest and in open agricultural country. It has been trapped in carrion-baited blowfly traps, and collected in Malaise-traps. It has been attracted to light and been caught indoors.

The puparium has been found in rotting wood: the larva was found by D. K. McAlpine in a rotting log in wet sclerophyll forest just above rain forest. The larva is apparently saprophagous (description below).

*Puparium* (Text-fig. 34): 6 mm. Dark reddish brown. Anterior spiracles small, conical; posterior spiracles apical (Text-fig. 34). Perianal plate as in Text-fig. 36. Posterior spiracle (Text-fig. 37) with 3 slits, weakly curved; 4 very inconspicuous perispiracular glands; distance factor 2·8.

Larval mouth-hooks as in Text-fig. 35. Anterior rods present. Dental sclerites separate, not fused to form a median ventral arch. Anterior dorsal bridge on basal piece absent. Lateral hooks joined basally by a narrow chitinized bridge, from which a chitinized strip is produced cephalad.

The mouth-hooks and spiracles agree in basic structure with those of *nubiana* as illustrated and keyed by Emden (1965 : 19, figs. 10 h and 11 o), with the following differences:

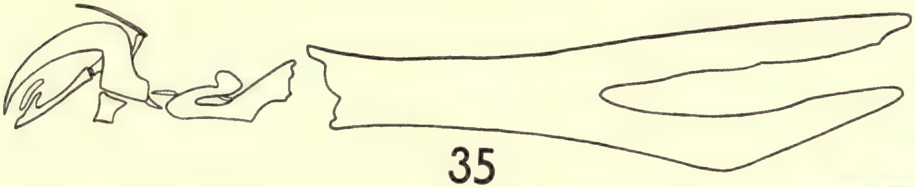
(1) The dental sclerites are stated by Emden to be fused to form a median ventral bridge. This is not so in *parimpar*.

(2) The narrow bridge connecting the lateral hooks, with its associated chitinized strip, is absent in *nubiana*.

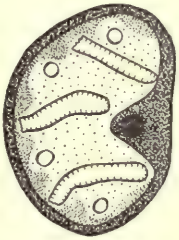
(3) The distance factor for the posterior spiracles is 4·4 in *nubiana* whereas it is only 2.8 in *parimpar*.

Variation: The abdominal colour pattern is very constant and of specific value. It should be borne in mind that tergites 4 and 5 may be partially or largely discoloured by the effects of post-mortem decay of the viscera, but with care such discolouration can be distinguished from a true black ground-colour and females can be reliably separated from those of *breviseta* using the abdominal characters given in the key above. Vein 3 is always bare above in the female. Hind tibia usually has 1 *av* seta, but in ten of the 101 specimens examined a second seta is present but only on one leg.

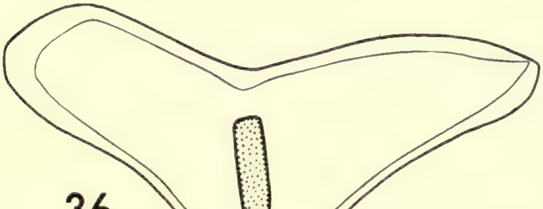
The colour of the palpi varies, and is broadly correlated with geographic distribution. In general the palpi are yellow, with the basal third to half brown, but some specimens have them entirely yellow and these tend to be the southern ones though a few Queensland specimens have also been seen with palpi almost entirely yellow.



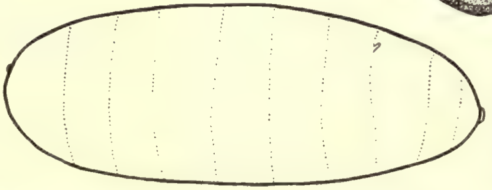
35



37



36



34

FIGS. 34–47. *Dichaetomyia parimpar* sp. n., immature stages (N.S.W., Blue Mts, Springwood, 11.ii.56, ♂ paratype): 34, puparium, lateral view (head to the right, dorsum above); 35, larval mouth-hooks, lateral view; 36, perianal plate; 37, posterior spiracle (spiracle distance factor = 2·8).

In leg setae, the following variation has been observed. Mid femur in basal half usually has a few *pv* setae almost as long as femoral depth, but these vary in number and strength and may be virtually indistinguishable from the ground-setulae. The *av* and *pv* setulae in basal third of hind femur also vary. In general there are three to four on each surface, quite distinct from the ground-setulae and about half femoral depth in length; sometimes they are vestigial and hardly developed, whilst in others they are very well developed, well over half femoral depth in length, quite numerous, and, on the *av* surface, almost forming a complete *av* row of setae.

The male interfrontalia is usually entirely obsolete on median third or more of frons, without even a seam indicated. In some males the seam is weakly indicated.

Affinities: *D. parimpar* is closely related to both *breviseta* and *parviseta* but may be distinguished from both by the characters given in the key and in the diagnoses of the three species. The male genitalia are more like those of *breviseta* than those of *parviseta*.

Discussion: This species was identified by Malloch (1925 : 327) as *impar* (Stein), but I have studied the syntypes of this latter species (see above, p. 219) and am satisfied that a distinct species is involved. I have also studied the male from Hamilton and female from Malanda, recorded as *impar* by Malloch (1925 : 327), and further Australian specimens so identified by him: these all belong to the present species.

### ***Dichaetomyia breviseta* sp. n.**

(Text-figs. 32, 33, 53, 56, 59)

Diagnosis: *D. breviseta* can be distinguished from the other species of the *impar*-group with a yellow mesonotum, except for *impar*, by the ground-colour of the abdomen, in which tergites 1 + 2 and 3 are entirely yellow in ground-colour but in which tergites 4 and 5 are always entirely black in ground-colour. In addition the male can be distinguished by the broader frons, at narrowest point equal to twice diameter of anterior ocellus, with interfrontalia distinct throughout between the parafrontalia. The female can be reliably separated from that of *parimpar* by the abdominal colouration and from that of *impar* by the presence of *av* setulae or setae in the basal half of mid and hind femora, but otherwise females of these species are almost indistinguishable.

♂. *Head:* Profile as in Text-fig. 32. Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite weak, only half length of anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row, most of which are black. Parafrontalia, parafacialia and face silvery white pruinose; genae black in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, grey or brownish grey pruinose. Parafrontalia slender throughout, at lunula equal to a little over diameter of anterior ocellus. 4–5 pairs of inclinate *ori* on lower half of frons in holotype and some paratypes (Text-fig. 33), with a few hair-like interstitials, the upper 1–2 pairs hair-like; in other paratypes the *ori* continuing as far as the *ors*, no gap present between them (Text-fig. 32); 1 pair of weak fine but distinct reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow; 3rd segment infuscated towards apex, white pruinose. 3rd antennal segment three times as long as broad, in frontal view reaching epistoma. Arista with long regular plumosity, the longest of which almost equals length of

3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia visible though slender; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin almost equal to width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Beard black, with some golden setae. Facial ridges with short hairs ascending to midway level of 3rd antennal segment. Mentum of proboscis brown. Palpi yellow, sometimes brown in basal quarter; compressed, quite slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Scutellum undusted, pleura virtually undusted. Anterior spiracle pale yellow. Mesonotum with the ground-setulae rather short and sparse, except those between the *dc*, black unless otherwise stated; some pleural ground-setulae paler towards tips. *Acr* 0 + 1, the single (*prsc*) pair well developed, slightly closer to each other than to the *dc*. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity usually with hairs. Supra-squamal ridge bare. Prosternum golden setulose. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with an auxiliary seta below; the former surrounded by few, the latter by numerous, dark setulae. 1st *npl* longer and stronger than 2nd. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on sub-alar ridge confined to anterior part, a few descending down to sternopleural and hypopleural margins and becoming paler towards tips, the lowest ones apparently dark yellow or brown at base but none wholly yellow. *Stpl* 1 + 2, the lower one weaker than anterior one, sometimes subequal to it, and only slightly closer to posterior one than to anterior one. Hypopleuron with the hairs on metepisternum pale or dark. Metathoracic spiracle small, subtriangular, with a row of black setulae on lower margin. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically and laterally. *Legs:* Yellow; tarsi yellow, 5th and usually 4th segments brown. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur with a few fine *pv* setae in basal third, none of which is as long as femoral depth, sometimes very reduced, otherwise without *av* or *pv* setae; 1 *a* and 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with 3–5 longer *av* and *pv* setulae in basal quarter, and with 2–4 preapical *av* setae; *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 *ad* and 1 (rarely 2) weaker *av* seta slightly apicad of it; some of the *pd* ground-setulae more erect in apical half; *ad* and *d* pre-apical setae subequal, and subequal to tibial depth. *Wings:* Yellowish tinged. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein with a few dark hairs below. Small cross-vein placed below the point where vein 1 enters costa. Hind cross-vein oblique, bowed to sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base and just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae rather deep yellow, margins of upper one concolourous with disc, margins of lower one creamy or concolourous, sometimes squamae and margins largely brownish, fringes pale. Knob of halteres yellow, or sometimes brown. *Abdomen:* Sternites yellow. In posterior view, tergites hardly dulled by dust, subshining; finely shagreened and not glossy, this being particularly noticeable on the apical black areas. Macrochaetae poorly developed and short, but rather stronger than in *parimpar*, especially the median marginals of tergite 4, and tergite 5 with more numerous discals than in *parimpar*. *Genitalia*: Text-figs. 53, 56, 59. *Measurements:* Length of body, 6·5–7·5 mm. Length of wing, 6·0–7·0 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle slightly less than an eye-width, broadening gradually towards lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, almost equal to 2nd *prst dc* seta, directed forwards and slightly outwards. The incurved *vti* not much longer than the outcurved *vte*; *pvt* weak, outcurved. Parafrontalia silvery white pruinose below, almost entirely brownish grey pruinose above part at lunula or above lower third, subshining black alongside ocellar tubercle; face more grey, genae brownish grey. Interfrontalia black in ground-colour, sometimes reddish at lunula; viewed from below, wholly brownish grey pruinose; frontal triangle visible as a subshining black streak extending three-fifths distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle almost twice diameter of anterior ocellus, at lunula as broad as width of 3rd antennal segment. Interfrontalia with the margins weakly convex, broadest at middle of frons, at lunula broader than a parafrontale, bare. 4 pairs of well developed inclinate *ori* on lower two-thirds of frons, with a few interstitials, the lowest pair very strong; 2 pairs of reclinate *ors*, the upper one stronger than the lower and placed closer to it than to *vti*; parafrontalia otherwise with short proclinate setulae along most of length. Parafacialia broader, opposite insertion of arista slightly broader than diameter of anterior ocellus, hardly tapering below. *Thorax:* The Howard Springs ♀ have the disc of scutellum partially to largely infuscated. *Legs:* 4th and 5th tarsal segments brown. Fore tibia in a Yeppoon ♀ with a small *p* seta on each side. Hind femur with the basal *av* and *pv* setulae scarcely developed, rather long or even longer than in male in some ♀. *Wings:* Hind cross-vein sinuate. *Abdomen*: Only tergite 1 + 2 yellow in Howard Springs ♀. *Measurements:* Length of body, 5·5–7·0 mm. Length of wing, 5·0–6·5 mm.

Holotype ♂. QUEENSLAND: Yeppoon, 10.v.1955 (*K. R. Norris*), CSIRO.

Paratypes, 11 ♂, 23 ♀. NORTHERN TERRITORY: Crocodile Islands, 1 ♂, 28.x.1924 (*G. H. Wilkins*), BMNH; Bill's Point, Mary River, 1 ♀, 3.viii.1929 (*I. M. Mackerras & T. G. Campbell*), CSIRO; Howard Springs, 3 ♀, 12.vi.1964 (*K. R. Norris*), 1 BMNH, 2 CSIRO. QUEENSLAND: Yeppoon, 2 ♂, 6 ♀, 10.v.1955 (*K. R. Norris*), 1 ♂, 2 ♀ BMNH, 1 ♂, 4 ♀ CSIRO. NEW SOUTH WALES: Church Point, 1 ♂, 1 ♀, 13.v.1959 (*I. F. B. Common*), CSIRO.

WEST IRIAN: Merauke, sea level, 1 ♀, 26.i–10.ii.1960 (*T. C. Maa*), Bishop; Biak Island, Mangrowawa, 50–100 m., 1 ♂, 29.v.1959 (*T. C. Maa*), Bishop. N.E. NEW GUINEA: Ajbom, Sepik River, 1 ♂, 7.iii.1964 (*D. H. Colless*), CSIRO. PAPUA: Port Moresby, Boroko, Malaise-trap, 1 ♂, 6–7.xi.1960 (*J. L. Gressitt*), Bishop; Moitaka, Port Moresby, in trap, 1 ♀, iii.1962 (*K. R. Norris*), CSIRO.

NEW BRITAIN: Keravat, 1 ♀, 23–30.vi.1965 (*R. W. Crosskey*), BMNH.

SOLOMON ISLANDS: Russell Is., Kaylan, 1 ♂, 8.xi.1934 (*R. A. Lever*), BMNH; Nggela, Halalu, 1 ♂, 28.x.1934 (*R. A. Lever*), BMNH; Vella Lavella, Pusisama, 1 ♀, xi.1964 (*P. Shanahan*), Bishop; Guadalcanal, Lunga River (mouth), 1 ♂, 26.v.1944, and 1 ♀, 9.vi.1944 (*H. E. Milliron*), Bishop; Guadalcanal, Lunga River (bridge), 1 ♂, 4.ix.1960 (*C. W. O'Brien*), Bishop; Guadalcanal, Tenaru R., 30–60 m., 1 ♀, 25.vi.1964 (*J. & M. Sedlacek*), Bishop; Malaita, Su'u, 1 ♀, iv.1933 (*R. J. A. W. Lever*), BMNH; New Georgia Group, Rendova Is., N.E. end, 1 ♀, 16.vii.1959 (*J. L. Gressitt*), BMNH; New Georgia Group, Kolombangara Is., Kukunda, S.W. coast, 1–12 m., ex fresh human excrement, 3 ♀, 8–11.vii.1959 (*J. L. Gressitt*), 1 BMNH, 2 Bishop; Bougainville, Arawa, 4–7 m. N. of Kieta, 1 ♀, 9–13.vii.1965 (*R. W. Crosskey*), BMNH.

Distribution and biology: Australia: Northern Territory, Queensland and New South Wales. New Guinea (West Irian, N.E. New Guinea, Papua), New Britain, and Solomon Islands (eastwards to Malaita Is.). A rare species in Australia.

This is a lowland species in Australia, and has been collected in riverine rain forest and in open country.

In New Guinea it occurs up to 100 m. and has been collected in Malaise-traps. In the Solomon Islands it has been found on fresh human excrement.

Life-history and immature stages unknown.

Variation: The description given above is based on Australian material, and the variation in Australian specimens will be briefly discussed here. New Guinea, New Britain and Solomon Islands specimens show rather more striking variation: this has not been taken into account in the description and is discussed in detail below.

In the holotype the *ori* are separated from the *ors* by a considerable gap (Text-fig. 33); in the male paratype from Crocodile Island, there is one setula in this gap; in the male paratypes from Yeppoon and Church Point, this gap is completely filled with fine setulae (Text-fig. 32). The male from Church Point also has the frons slightly broader than in other males, with the interfrontalia a little broader than diameter of anterior ocellus; it also has the squamae broadly brown and the knob of halteres brown. One female from Yeppoon has a short *p* seta on each fore tibia, the only specimen in about 160 specimens of the *impar*-group studied by me to be aberrant in this way. The females from Howard Springs have the disc of the scutellum partially to largely infuscated, the abdomen with only tergite 1 + 2 yellow, knob of halteres very infuscated, and the basal *av* and *pv* setulae on hind femur stronger and more numerous than usual; this latter character links the usual condition of these setulae in Australia and the Solomon Islands *breviseta* with the rather hypertrophied condition in New Guinea, New Britain and Bougainville females.

The New Guinea males have the pteropleural setulae golden or golden-tipped below, and the setulae around propleural and prostigmatal setae golden (Boroko) or black; palpi wholly yellow, 3rd antennal segment weakly to distinctly infuscated, 4th and 5th tarsal segments brown; a large gap between *ori* and *ors* (as in Text-fig. 33) in the Boroko ♂; in the Biak Is. and Sepik ♂, the frons is broader, equal to 3 times diameter of anterior ocellus, interfrontalia equal to twice diameter of anterior ocellus, with 6–7 *ori* and no gap between *ori* and *ors*; tergites 4 and 5 black, tergite 3 with or without a dark hind-margin and median line; prosternum golden or dark setulose; hind tibia with 1 *av* seta. The females have the prosternal setulae mainly dark, palpi yellow or brown at base, and hind tibia with 1 *av* seta; tergite 3 yellow or largely infuscated. Both males and females may have the *pv* and *av* setulae in the basal half of hind femur weak or well developed, half or more femoral depth.

The females from Keravat and Bougainville have the hind femoral setulae well developed as in the New Guinea females; prosternal setulae mainly dark, colour of palpi and antennae typical; abdomen wholly yellow (Keravat), only apical half of tergite 5 and hind-margin of tergite 4 black (Bougainville).

Variation in material from the Solomons is more marked. The males vary as follows: 3rd antennal segment wholly yellow to only faintly infuscated at tip. The gap between *ori* and *ors* not bridged (Russell), feebly bridged (Nggela) or entirely bridged (Lunga mouth); in the Lunga Bridge male the frons is slender, at narrowest point separated by only a little over diameter of anterior ocellus, but the interfrontalia is distinct throughout and the *ori* and *ors* are not connected. Facial ridges without hairs above the cluster at vibrissal angle, except in the Lunga Bridge male. Palpi dark with the apical half to quarter yellow, wholly yellow in the Lunga Bridge male. Pteropleural setulae pale below in the Lunga Bridge male. The last 3, sometimes 4, tarsal segments brown. Hind femur rather more hairy ventrally, except in the

Lunga males. Hind tibia more frequently with a second *av* seta, often on both legs. Tergite 4 yellow except for hind-margin and a broad median triangle.

Solomon Islands females are rather uniform and differ less strikingly from the typical form. The Malaita female has the apical half of tergite 4 infuscated, and the last 3–4 tarsal segments dark. Lunga River and Vella Lavella females are typical except for the dark tarsal segments 2–5 in the latter. The Tenaru female is typical except that anterior half of tergite 4 is yellow. The Rendova female is typical, but the posterior half of tergite 3 and all of tergites 4 and 5 except for the antero-lateral corners of tergite 4 are dark. The Kolombangara females have the tarsi brown, with only the metatarsi rather yellow, and the abdominal pattern more or less as in the Rendova female.

Affinities: This species is closely related to *parimpar* and *parviseta*, but is closest to *impar* which it replaces in the Australasian region. The differences between *breviseta* and *impar*, of which only the female is known, are slight but such differences are in my view sufficient to justify the description of *breviseta* as new, and are supported by the enormous gap separating Java and New Guinea and the complete absence of records of the species from the intervening territories. It is also certain that more significant differences will be found when the male of *impar* is discovered.

## ***Dichaetomyia parviseta* sp. n.**

(Text-figs. 31, 54, 57, 60)

Diagnosis: *D. parviseta* can be distinguished from the other species of the *impar*-group in the male sex by the yellow undusted mesonotum, entirely black abdomen, yellow pteroplural setulae, deep yellow wing-base and squamae, 2 *av* setae on hind tibia, and 2 *d* preapical setae on hind femur. The female is at present unknown.

♂. *Head:* Frons slender, at narrowest point eyes separated by a little over, to almost twice, diameter of anterior ocellus. Eyes virtually bare, with only the usual microscopic pubescence; upper inner facets not much enlarged. Ocellar setae quite weak, half to three-quarters length of anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row, most of which are black. Parafrontalia, parafacialia and face silvery white pruinose; genae black in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender throughout, at lunula equal to a little over diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula, visible only as a seam on median third of frons. 3–4 pairs of inclinate *ori* on lower two-fifths of frons, with 1–2 hair-like interstitials; 1 pair of fine hair-like *ors* just before ocellar tubercle (Text-fig. 31); in the San Cristobal ♂ there are 2 pairs of hair-like setulae bridging the gap between *ori* and *ors*. Antennae and basal third of arista yellow; 3rd segment white pruinose. 3rd antennal segment 3 times as long as broad, in frontal view reaching epistoma. Arista with long regular plumosity, the longest of which almost equals length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia largely invisible; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin almost equal to width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Beard black, with numerous golden setae. Facial ridges with short hairs ascending to midway level of 3rd antennal segment. Mentum of proboscis brown. Palpi brown, the tips yellow; compressed, quite slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum undusted, without traces of any white dust at neck or along *prst dc* rows. Scutellum undusted, pleura virtually undusted. Anterior spiracle pale yellow. Mesonotum with the ground-setulae rather short and sparse, except those between the *dc*, black unless otherwise stated; those on pleura golden unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair well developed, placed behind the transverse level of *prsc dc* and slightly closer to each other than to the *dc*. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity with a few pale hairs. Supra-squamal ridge bare. Prosternum golden setulose. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with an auxiliary seta below; the former surrounded by few, the latter by numerous golden setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron bare or with 1–3 dark or golden setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on sub-alar ridge confined to anterior part, a few descending down to sternopleural and hypopleural margins, all of them golden, only a few of those on sub-alar ridge sometimes brown. *Stpl* 1 + 2, the lower one slightly shorter than the anterior one and only slightly closer to posterior one than to anterior one. Hypopleuron with the hairs on metepisternum golden. Metathoracic spiracle small, subtriangular, with a row of black setulae on lower margin. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically and laterally. *Legs:* Yellow, tarsal segments 3–5 brown. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur with a few fine *pv* setae in basal third, none of which is as long as femoral depth, otherwise without *av* or *pv* setae; 1 *a* and 3–4 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with 3–4 longer *av* and *pv* setulae in basal third, and with 3–4 preapical *av* setae; *ad* row complete; 2 *d* and 1 *pd* preapical setae. Hind tibia with 1 *ad* and 2 weaker *av* setae; some of the *pd* ground-setulae more erect in apical half; *ad* and *d* preapical setae subequal, and subequal to tibial depth. *Wings:* Yellowish tinged, intensely so at base. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein with a few golden hairs below. Small cross-vein placed basad of or below the point where vein 1 enters costa. Hind cross-vein oblique, weakly sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base and just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae and margins deep yellow, fringes pale. Knob of halteres brown. *Abdomen:* Ground-colour entirely black. Sternite 1 yellow, sternites 2–5 black. In posterior view, tergites hardly dulled by dust, subshining; finely shagreened and not glossy. Macrochaetae quite well developed, rather stronger and more erect than in *breviseta*: tergites 4 and 5 each with a marginal row, tergite 4 with 1–2 lateral discals and tergite 5 with a discal row. Sternite 1 golden setulose. *Genitalia*: Text-figs. 54, 57, 60. *Measurements:* Length of body, 7·0–8·0 mm. Length of wing, 6·5–7·5 mm.

♀. Unknown.

Holotype ♂. SOLOMON ISLANDS: Ugi, 6.v.1934 (*R. A. Lever*), BMNH.

Paratypes, 3 ♂. SOLOMON ISLANDS: Ugi, 2 ♂, 6.v.1934 (*R. A. Lever*), BMNH; San Cristobal, Kira-Kira, 0–50 m., swept, 1 ♂, 10.xi.1964 (*R. Straatman*), Bishop.

Distribution and biology: Known only from the most eastern islands of the Solomons group, Ugi and San Cristobal. Life-history and immature stages unknown; one adult was swept, habits otherwise unknown.

Affinities: *D. parviseta* is more closely related to *breviseta* than to *parimpar* or *impar*, as the broader frons and more strongly developed abdominal macrochaetae indicate. The male 5th sternite has however much shorter lobes than any of these species. The entirely dark abdomen, pale pleural setulae, and deep yellow wing-base and squamae give it a very characteristic appearance and separate it immediately from the other species. The unknown female may be expected to have these characters too. Certain characters that are constant in the small series available, such as colour of antennae and palpi, few *npl* setulae and 2 *av* setae on hind tibia, may be found to vary when further material is studied.

Discussion: It seems to be more likely that this is an island species that has evolved in the eastern Solomon Islands from proto-*breviseta-parimpar* stock, than that it is a species of formerly wide distribution that has gradually been superseded and replaced by *breviseta*, penetrating from the west, and now restricted to what were previously the outer limits of its distribution.

## THE *VICARIA*-GROUP

This group includes fourteen described Oriental and Australasian species in which there are 4 *post dc* setae, fore tibia without a submedian *p* seta, and scutellum without black or pale setulae on the lateral or ventral surfaces, at most with a few setulae descending just below the level of the strong setae.

The *vicaria*-group possesses the following additional characters:

Mentum of proboscis dusted. 2 *prst dc* setae. *Prst acr* setulae 7- to 9-serial. *Pra* well-developed but short, about half length of 2nd *npl*. Vallar ridge haired anteriorly or bare. Hypopleuron bare on beret, haired below spiracle and on metepisternum, rarely bare individually. Squamopleuron haired. Scutellum with up to 10 setulae descending just below the level of the strong setae. Stem-vein usually bare above, sometimes with a few fine short pale hairs at base. Lower squama bare.

So far as I know there are fourteen described species and three subspecies in this group, most of which are Australasian. I have also seen a number of undescribed species from Melanesia and the Pacific. Apart from the eight Australian species discussed in this paper, the following species belong to this group:

*D. prolixa* (Walker) from Makasar, with its subspecies *bioculata* Emden (Thailand, Malaya) and *pallidorsis* Emden (Thailand, Ceylon). *D. prolixa prolixa* has a broad black vitta on the mesonotum from neck to scutellum, between the *dc* setae, tergites 3 and 4 with broad black fasciae, tergite 5 with a pair of black lateral spots. *D. prolixa bioculata* has the mesonotum almost entirely dark, pteropleural and prosternal setulae dark, male hind femur with a few *pv* setae confined to basal $\frac{2}{3}$. *D. prolixa pallidorsis* has the mesonotum immaculate, abdomen immaculate except for a pair of black lateral spots on tergite 5, and hind femur with some *pv* setae in basal half; it differs from *australis* sp. n. by the black prosternal setulae among other characters.

The following Micronesian species, described and keyed by Snyder (1965 : 296 ff.), belong to this group: *mariana* Snyder, *yapensis* Snyder, *trukensis* Snyder, and *saperoi* Bohart and Gressitt. To judge from the descriptions, they are all most closely allied to *australis* sp. n. and *megophthalma* Malloch.

*D. fumicosta fumicosta* Malloch and *fumicosta savaii* Malloch from Samoa both have the wings very conspicuously infuscated. Otherwise they are closely related to *australis* and *megophthalma*; see below under *australis* (p. 241).

## ***Dichaetomyia terraereginae*** Malloch

(Text-figs. 4, 6, 62, 65, 68)

*Dichaetomyia terraereginae* Malloch, 1925 : 325. Holotype ♂, QUEENSLAND: Dawson River. In the School of Public Health and Tropical Medicine, Sydney. [Examined.]
*Dichaetomyia terraereginae* Malloch; Lee, Crust & Sabrosky, 1956 : 337.

Note on types: Malloch (l.c.) described the " type and allotype " as from the Dawson River, Queensland, 1923 (*Bancroft*). Lee, Crust & Sabrosky (l.c.) state that the holotype male is in the BM, but this BM male, labelled as type by Malloch, is from S. Queensland. The holotype, from Dawson River, is actually in the SPHTM, and is also labelled as type by Malloch. Evidently the error in Lee, Crust & Sabrosky is due to Malloch's labelling two different males as type. I have studied the holotype (SPHTM), allotype (SPHTM) and 12 paratypes (8 in BM, 2 in SPHTM, 2 in USNM). One male paratype, from Loowanna, E. Dorrigo, 30.i.1923 (in SPHTM), is certainly not *terraereginae* and is probably *vicaria* (Walker). Otherwise all the type-material belongs to my concept of this species.

Diagnosis: *D. terraereginae* can be distinguished from all other species of the *vicaria*-group except for *rufaeformis* and *megophthalma* by the entirely black prosternal and pteropleural setulae, and by the absence of setulae on the ridge between inner post-alar seta and scutellum (as in Text-fig. 2). In the male sex, *terraereginae* differs from both these species by the long preapical *av* and *pv* setae on hind femur (Text-figs. 4 and 6), but the female cannot be distinguished from that of *rufaeformis*.

♂. *Head:* Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite strong, but not as long as anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row, which are almost entirely black. Parafrontalia and parafacialia silvery white pruinose, face more thinly so; genae brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts brownish grey pruinose. Parafrontalia slender, at lunula equal to diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula, visible as a line or obsolete and not even visible as a seam on median third of frons. 1 pair of strong *ori* at lunula, with a weaker pair and 3–5 hair-like pairs above them, all on lower two-fifth to half of frons; 1 pair of tiny reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow, the first two segments sometimes dull yellow, 3rd segment largely darkened beyond arista, grey pruinose. 3rd segment three and a half times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which almost or quite equals length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to slightly less than diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia visible though slender, or only partially visible; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to slightly less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges without short hairs above the usual cluster at vibrissal angle, or a few ascending to level of lower third of 3rd antennal segment. Mentum of proboscis black. Palpi wholly brown, to yellow in apical half and brown in basal half, to wholly dull yellow; compressed, slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum uniformly whitish grey dusted, more densely so before suture where a pair of narrow undusted paramedian vittae is indicated mesad of the *dc*; sometime also with a pair of undusted patches indicated before suture between *ph* and *dc*, and behind suture between *ia* and *dc*. Scutellum thinly white dusted, more conspicuously so in basal lateral corners; pleura virtually undusted. Spiracles pale yellow. Mesonotum with the ground-setulae quite numerous and erect, especially between the *dc*, all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair quite strong, closer to each other than to the *dc*. All *dc* setae strong. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one almost twice length of the anterior one. 2 *ia*, the anterior one fine. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae. Post-alar declivity with a few scattered pale or dark hairs. Supra-squamal ridge bare. Propleural depression bare. 1 propleural and 1 prostigmatal seta, the former with an auxiliary seta; the former surrounded by few, the latter by numerous setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with several setulae around the bases of both setae though fewer around the anterior one. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on subalar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one weaker than anterior one and much closer to posterior one than to anterior one. Hypopleuron with the hairs on metepisternum sometimes absent. Metathoracic spiracle quite large, subtriangular, with a row of black setulae on lower margin. Scutellum with very strong apical and sub-basal lateral setae. Disc with rather fine setulae, a few stronger ones apically and laterally. *Legs:* Yellow; tarsal segments 4 and 5 brown, often also segment 3, sometimes only segment 5. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur without setae except for 1 *a* and 3 *d-p* preapical setae, but the *av* and *pv* ground-setulae rather denser in basal half. Mid tibia with 2 *p* setae. Hind femur with the *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 strong *ad* and (0–)1(–2) fine *av* setae slightly apicad of it; some of the *pd* ground-setulae more erect in apical half; *d* preapical seta subequal to tibial depth, slightly shorter than the *ad*. *Wings:* Rather yellowish tinged, especially at base, sometimes quite intensely so; the veins pale. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, with a few pale or dark hairs below. Small cross-vein placed below or slightly beyond the point where vein 1 enters costa. Hind cross-vein oblique, rather sinuate. Vein 1 bare. Vein 3 usually with a few setulae on the node at base above; below with setulae on the node at base extending about halfway to small cross-vein. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae rather dirty yellow, margins concolourous. Knob of halteres dull yellow. *Abdomen:* Ground-colour yellow, tergites 4 and 5 usually darkened. Sternites yellow. In posterior view, tergites rather dulled by dust. Macrochaetae quite erect: tergite 3 with some lateral marginals, tergite 4 with some lateral discals and a marginal row, tergite 5 with a discal row, interrupted medially, and a marginal row. *Genitalia:* Text-figs. 62, 65, 68. *Measurements*: Length of body, 6·0–7·0 mm. Length of wing, 5·5–6·5 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, almost equal to 2nd *prst dc* seta, directed forwards and slightly outwards. The incurved *vti* not much longer than the outcurved *vte*; *pvt* outcurved, over half length of *vte*. Parafrontalia silvery white pruinose on lower quarter to third, otherwise grey pruinose, usually subshining black alongside ocellar tubercle. Interfrontalia black in ground-colour; viewed from below, brownish grey pruinose with the frontal triangle contrasting brown; frontal triangle otherwise visible as an ill-defined black streak extending three-quarters or almost the entire distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle equal to twice diameter of anterior ocellus, at lunula broader than width of 3rd antennal segment. Interfrontalia with the margins convex, broadest at middle of frons, at lunula broader than a parafrontale, bare. 3–4 pairs of inclinate *ori* on lower two-thirds of frons, only the lowest pair really strong, with a few interstitials; 2 pairs of reclinate *ors*, the upper pair stronger than lower and placed closer to it than to *vti*; parafrontalia otherwise with short proclinate setulae on whole length. Parafacialia slightly broader, opposite insertion of arista slightly broader than diameter of anterior ocellus. In lateral view, parafrontalia and parafacialia visible but slender. Facial ridges with the hairs ascending to midway level of 3rd antennal segment. Palpi brown. *Thorax:*

Viewed from above and behind, mesonotum and scutellum undusted except on humeri and a small median patch of white dust at neck. *Prsc acr* placed on, behind or in front of the transverse level of *prsc dc*. Auxiliary prostigmatal seta well developed, sometimes weak. Notopleuron with very few setulae, often bare around 1st seta. *Legs:* Sometimes all tarsi yellow except for the brownish 5th segment. Mid femur without denser erect *av* and *pv* ground-setulae. Hind femur with 4 preapical *av* setae, none equal to femoral depth. *Abdomen:* In posterior view virtually undusted. Macrochaetae reduced: tergite 4 with 1–2 lateral discals and a few lateral marginals, tergite 5 with a few lateral discals and a weak marginal row. *Ovipositor:* Indistinguishable from that of *rufaeformis*. *Measurements:* Length of body, 6·0–6·5 mm. Length of wing, 5·5–6·0 mm.

Material examined. Holotype ♂. QUEENSLAND: Dawson River, 1923 (*Bancroft*), SPHTM.

QUEENSLAND: Dawson River, 1923 (*Bancroft*), ♀ allotype, SPHTM; 8 ♂ paratypes (*Bancroft*), BMNH; Brisbane, 2 ♂, 6 ♀, 14.vii.1914 (*H. Hacker*), 1 ♂, 2 ♀ BMNH, 1 ♂, 4 ♀ Qld. Mus.; 1 ♂, 1 ♀, 7.iii.1925 (*H. Hacker*), Qld. Mus.; Dawson River, 1 ♀, 1923 (*Bancroft*), SPHTM; Tinaroo Falls Dam, open savannah, 1 ♂, 5 ♀, 27.iv.1967 (*D. H. Colless*), 1 ♀ BMNH, 1 ♂, 4 ♀ CSIRO; Eungella, via Mackay, 2,300 ft., 1 ♂, 1 ♀, iii.1929 (*F. H. Taylor*), SPHTM; Nindooinbah, 1 ♂, v.1954 (*K. R. Norris*), CSIRO; 11 miles N. of Yeppoon, 1 ♂, 10.v.1955 (*K. R. Norris*), CSIRO; 63 miles N. of Marlborough, 1 ♂, 9.v.1955 (*K. R. Norris*), BMNH; Mt. Tambourine, 1 ♂, 1 ♀, 9.iv.1955 (*K. R. Norris*), CSIRO; Fassifern Valley, 1 ♂, 23.ii.1954 (*K. R. Norris*), CSIRO; Numinbah Valley, 1 ♂, 3 ♀, 5.xi.1954 (*R. Meyers*), 1 ♀ BMNH, 1 ♂, 2 ♀ CSIRO; Highvale, 14 miles N.W. of Brisbane, 1 ♂, 3.i.1960 (*R. Straatman*), CSIRO; Clayton Gully, 2½ miles E. of Cunningham's Gap, 1 ♂, 1 ♀, 1.vi.1966 (*Z. Liepa*), ♂ BMNH, ♀ CSIRO; Beerburrum Creek, Beerburrum, 1 ♂, 23.v.1966 (*Z. Liepa*), CSIRO; Mitchell Gully, 2 miles E. of Cunningham's Gap, 1 ♂, 5 ♀, 2.vi.1966 (*Z. Liepa*), 2 ♀ BMNH, 1 ♂, 3 ♀ CSIRO.

NEW SOUTH WALES: Coramba-Dorrigo Road, 1,000 ft., 1 ♂ paratype, 31.i.1923 (Health Dept.), USNM; Lisarow, on human faeces, 2 ♂ paratypes, 1.v.1915, USNM and SPHTM; Cessnock, 1 ♂, 21.iv.1955 (*I. G. Filmer*), Qld. Mus.; Waterfall, by sweeping, 1 ♂, 23.xi.1959 (*M. Nikitin*), BMNH; Ryde Road [near Sydney], on *Aralia* flowers, 1 ♂, 6.vi.1963 (*J. H. Ardley*), SPHTM; Sydney University, W/A Trapping, 2 ♂, 12–15.iv.1963 (*J. H. Ardley*), SPHTM; Maroubra, Sydney, 1 ♂, 24.v.1925 (Health Dept.), SPHTM; Allowrie, Killara, 1 ♂, 15.iii.1922, SPHTM; Glenbrook, 1 ♂, 5.v.1931 (*F. Gay*), CSIRO; Gordon, 1 ♂, 7.ii.1934 (*D. F. Waterhouse*), BMNH; Colo Vale Bottom, 1712–30, to man, 1 ♂, 24.iv.1956 (*A. Dyce*), SPHTM; Springwood, Blue Mountains, 2 ♂, 10.i.1956, and 1 ♀, 30.i.1956 (*D. K. McAlpine*), Aust. Mus.; N. Bondi, 1 ♂, 1 ♀, 22.iv.1962, 1 ♀, 4.vi.1962, and 1 ♀, 5.v.1962 (*K. Kota*), Aust. Mus.; Whian Whian State Forest, near Lismore, m.v. lamp, 1 ♂, 25.ii.1965 (*McAlpine and Lossin*), Aust. Mus.; 30 miles S. of Singleton, Putty Road, 1 ♂, 3 ♀, 6.ii.1968 (*D. H. Colless*), 1 ♀ BMNH, 1 ♂, 2 ♀ CSIRO; Scotts Head, near Warrell Creek, 1 ♂, 13.ii.1968 (*D. H. Colless*), CSIRO; Upper Allyn River, 1 ♂, 14.ii.1968 (*D. H. Colless*), BMNH.

Distribution and biology: Australia: Queensland and New South Wales. A common species.

This species is found quite commonly up to 330 m. in mainly dry habitats: open dairy country, open savannah, and savannah woodlands. It is found less commonly in wet eucalyptus forest, residual rain forest, and subtropical rain forest. It has been collected on *Aralia* flowers and by sweeping, in carrion-baited blowfly traps and in Western Australian fly traps. It has been caught on human faeces and on man.

Life-history and immature stages unknown.

Variation: Some specimens lack the hairs on metepisternum, and a few possess a single setula on the vallar ridge.

Affinities: *D. terraereginae* is unique among males of the *vicaria*-group in possessing long preapical *av* and *pv* setae on hind femur. Several species have *pv* setae on hind femur, but these are always arranged in a complete or partially complete row, before the apical third, and are never as long and strong as they are in this species.

### ***Dichaetomyia rufaeformis* sp. n.**

(Text-figs. 2, 5, 7, 63, 66, 69)

Diagnosis: *D. rufaeformis* can be distinguished from all other species of the *vicaria*-group except for *terraereginae* and *megophthalma* by the entirely black prosternal and pteropleural setulae and by the absence of setulae on the ridge between inner post-alar seta and scutellum (Text-fig. 2). In the male sex, *rufaeformis* differs from both species by the lack of strong *pv* setae on hind femur except for a short submedian one (Text-fig. 5), but the female cannot be distinguished from that of *terraereginae*.

♂. *Head:* Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite strong, but not as long as anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row, which are almost entirely black. Parafrontalia and parafacialia silvery white pruinose, face more thinly so; genae greyish pruinose. Interfrontalia viewed from below, with the visible parts brownish grey pruinose. Parafrontalia slender, at lunula equal to diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula, obsolete on median third of frons and not even visible as a seam. 3 pairs of inclinate *ori*, with 3–4 fine interstitials, all on lower two-fifths of frons; 1 pair of tiny reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow; 3rd segment weakly to conspicuously infuscated beyond arista or just before tip, whitish pruinose. 3rd segment three and a half times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which exceeds length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to slightly less than diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia visible though slender; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to slightly less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending to level of lower third of 3rd antennal segment. Mentum of proboscis black. Palpi usually wholly brown, sometimes yellow at apex and grading to brown at base; compressed, slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum uniformly whitish grey dusted, more densely so before suture where a pair of narrow undusted paramedian vittae is usually indicated mesad of the *dc*; usually also an undusted patch indicated before suture between *ph* and *dc*, and, after suture, between *ia* and *dc*. Scutellum quite densely dusted, thinning out towards tip. Pleura virtually undusted. Spiracles pale yellow. Mesonotum with the ground-setulae quite numerous and erect, especially between the *dc*, all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair quite strong and closer to each other than to the *dc*. All *dc* setae strong. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one almost twice length of the anterior one. 2 *ia*, the anterior one fine. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae. Post-alar declivity with a few scattered pale or dark hairs. Supra-squamal ridge bare. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with an auxiliary seta below; the former surrounded by few, the latter by numerous, setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with several setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one weaker than anterior one and much closer to posterior one than to anterior one. Metathoracic spiracle quite large, subtriangular, with a row of black setulae on lower margin. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather fine setulae, a few stronger ones apically and laterally. *Legs:* Yellow, tarsal segments 3 to 5 brown. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur without setae except for 1 *a* and 3 *d-p* preapical setae, but the *av* and *pv* ground-setulae rather denser in basal half. Mid tibia with 2 *p* setae. Hind femur with the *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 strong *ad* seta, and 1 fine *av* slightly apicad of it; some of the *pd* ground-setulae more erect in apical half; *d* preapical seta subequal to tibial depth, slightly shorter than the *ad*. *Wings:* Rather yellowish tinged, especially at base; the veins pale. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, with several short dark hairs below. Small cross-vein placed slightly basad to apicad of the point where vein 1 enters costa. Hind cross-vein oblique, rather sinuate. Vein 1 bare. Vein 3 often with a few setulae on the node at base above; below with setulae on the node at base extending about halfway to small cross-vein. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae rather dirty yellow, margins concolourous. Knob of halteres dull yellow. *Abdomen:* Ground-colour mainly yellow, but rather variable in extent of infuscation: tergite 1 + 2, most of tergite 3 and part or apical half of tergite 5 yellow; hind-margin of tergite 3, tergite 4 and anterior part or half of tergite 5 dark; but sometimes much lighter, with dark areas very reduced. Sternites yellow to dark. In posterior view, tergites uniformly dusted grey to brownish grey, without an undusted median vitta or undusted hind-margins. Macrochaetae quite erect: tergite 3 with some lateral marginals, tergite 4 with some lateral discals and a marginal row, tergite 5 with a discal row that is interrupted medially and a marginal row. *Genitalia:* Text-figs. 63, 66, 69. *Measurements:* Length of body, 5·5–6·5 mm. Length of wing, 5·0–6·0 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, almost equal to 2nd *prst dc* seta, directed forwards and slightly outwards. The incurved *vti* not much longer than the outcurved *vte*; *pvt* outcurved, weak, usually over half length of *vte* but sometimes shorter. Parafrontalia silvery white pruinose on lower quarter only, otherwise grey pruinose, subshining black alongside ocellar tubercle. Interfrontalia black in ground-colour; viewed from below, greyish pruinose with the frontal triangle not usually contrasting brownish; frontal triangle otherwise visible as an ill-defined black streak extending three-quarters distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle equal to twice diameter of anterior ocellus, at lunula broader than width of 3rd antennal segment. Interfrontalia with the margins convex, broadest at middle of frons, at lunula subequal to or broader than a parafrontale, bare. 3–4 pairs of inclinate *ori* on lower two-thirds of frons, only the lowest pair really strong, with a few interstitials; 2 pairs of reclinate *ors*, the upper pair stronger than lower and placed closer to it than to *vti*; parafrontalia otherwise with short proclinate setulae on whole length. 3rd antennal segment more strongly infuscated, dark beyond insertion of arista. Parafacialia slightly broader, opposite insertion of arista slightly broader than diameter of anterior ocellus. Facial ridges with the hairs ascending to midway level of 3rd antennal segment. Palpi brown, yellow at apex. *Thorax:* Viewed from above and behind, mesonotum and scutellum undusted except on humeri and a small median patch of white dust at neck. *Prsc acr* placed on or behind the transverse level of *prsc dc*. Auxiliary prostigmatal present, sometimes absent. Notopleuron with fewer setulae, often bare around 1st seta. *Legs:* Sometimes only 4th and 5th tarsal segments brown. Mid femur without denser erect *av* and *pv* ground-setulae. Hind femur with 3–4 preapical *av* setae, only 1 equal to femoral depth. *Abdomen:* In posterior view virtually undusted. Macrochaetae reduced: tergite 4 with 1–2 lateral discals and a few lateral marginals, tergite 5 with a few lateral discals and a weak marginal row. *Ovipositor:* Indistinguishable from that of *terraereginae*. *Measurements:* Length of body, 5·5–6·5 mm. Length of wing, 5·0–6·0 mm.

Holotype ♂. QUEENSLAND: 1 mile E. of Kuranda, 4.v.1955 (*K. R. Norris*), CSIRO.

Paratypes, 25 ♂, 20 ♀. QUEENSLAND: Byfield, 2 ♂, 1 ♀, 10.v.1955 (*K. R. Norris*), 1 ♂, BMNH, 1 ♂, 1 ♀ CSIRO; 14 miles S.W. of Sarina, 2 ♂, 8.v.1955 (*K. R. Norris & I. F. B. Common*), CSIRO; Iron Range, 2 ♂, 5 ♀, 11 and 13.iv.1964 (*I. F. B. Common & M. S. Upton*), 1 ♂, 2 ♀ BMNH, 1 ♂, 3 ♀ CSIRO; 4 miles E. of El Arish, 1 ♂, 1 ♀, 1.v.1958 (*T. G. Campbell*), CSIRO; Forest Road, near Ingham, 1 ♂, 20.iii.1961 (*R. Straatman*), CSIRO; 4 miles W. of Kuranda, 1 ♀, 4.v.1955 (*K. R. Norris*), CSIRO; Bamaga, Cape York, 1 ♀, 4.iv.1964 (*I. F. B. Common & M. S. Upton*), CSIRO; Cairns, ex corn, 1 ♂ (*A. P. Dodd*), Bishop; Kuranda, 200 m., 1 ♀, 14.iii.1956 (*J. L. Gressitt*), Bishop; 3 miles W. of Kuranda, Mareeba Road, 1 ♂, 3.v.1967 (*D. H. Colless*), CSIRO; Earl Hill, N. of Cairns, 2 ♂, 1 ♀, 8.v.1967 (*D. H. Colless*), CSIRO; Bramston Beach, near Innisfail, rainforest fringe, 1 ♂, 30.iv.1967 (*D. H. Colless*), BMNH; Bramston Beach, near Innisfail, open savannah, 1 ♂, 1 ♀, 30.iv.1967 (*D. H. Colless*), CSIRO; Claudie River near Mt. Lamond, 1 ♂, 1 ♀, 1.vi.1966, and 1 ♀, 29.v.1966 (*D. K. McAlpine*), Aust. Mus.; Kuranda, 1 ♂, 28.xii.1958, and 1 ♂, 21.v.1958 (*D. K. McAlpine*), Aust. Mus.; Mulgrave River, 4 miles W. of Gordonvale, 1 ♂, 29.xii.1958 (*D. K. McAlpine*), Aust. Mus.; Mt. Spec, 2 ♂, 1 ♀, 1.iv.1965 (*D. E. Havenstein*).

NORTHERN TERRITORY: Lee Point, Darwin, 5 ♂, 5 ♀, 7.iii.1967 (*M. S. Upton*), 1 ♂, 1 ♀ BMNH, 4 ♂, 4 ♀ CSIRO.

Not paratypes. QUEENSLAND: Cape York, Bamaga, 1 ♂, 15.ii.1962 (*D. B. Copeman*), CSIRO; Kuranda, 200 m., 1 ♂, 4 ♀, 14.iii.1956 (*J. L. Gressitt*), 1 ♀ BMNH, 1 ♂, 3 ♀ Bishop; Kuranda, 1 ♀, 13.iii.1956 (*J. L. Gressitt*), Bishop; Kuranda, 350 m., 1 ♀, 7.v.1961 (*L. & M. Gressitt*), Bishop; Kuranda, 350 m., rain forest, 1 ♂, 6.v.1961 (*L. & M. Gressitt*), Bishop; Stanthorpe, 1 ♂, 31.v.1927 (*H. Jarvis*), Qld. Dept. Pr. Ind.; Springsure, 2 ♂, 1 ♀, 2.iii.1965 (*D. E. Havenstein*), CSIRO.

Not paratypes. WEST IRIAN: Eramboe, 80 km. ex Merauke, 3 ♂, 2 ♀, 5.ii.1960 (*T. C. Maa*), 1 ♂, 1 ♀ BMNH, 2 ♂, 1 ♀ Bishop. PAPUA: Brown River, 5 m., Malaise-trap, 1 ♂, 23.x.1960 (*J. L. Gressitt*), Bishop; W. District, Oriomo Govt. Sta., Malaise-trap, 1 ♀, 26–28.x.1960 (*J. L. Gressitt*), Bishop.

Distribution and biology: Australia: Northern Territory and Queensland. New Guinea (West Irian and Papua). A common species.

This species is found quite commonly up to 350 m. in rain forest and open country: tropical rain forest, residual rain forest in dairy land and cane areas, open savannah and farming country. It has been trapped in carrion-baited blowfly traps, and collected on corn.

In New Guinea it has been collected in Malaise-traps.

Life-history and immature stages unknown.

Variation: A very consistent species in colour and structure. The minor variations are noted in the description.

Affinities: In Australia, this species is very closely related to *terraereginae*, and females of the two cannot be separated. At first, however, I considered *rufaeformis* to be a form of *vicaria*, possessing the hind femoral setae of *vicaria* but the dark thoracic setulae of *terraereginae*. Further study and dissection of the genitalia showed quite clearly that a distinct species is involved close to *terraereginae* (Text-figs. 62–63, 65–66, 68–69, compare 72, 75, 78). *D. rufaeformis* can be separated from *vicaria* by the characters given in the key above, and these structural and chromatic characters are remarkably constant.

It is also very closely related to *yapensis* Snyder, from Yap Island in the Caroline group, but this species differs from *rufaeformis* by the different mesonotal pattern (dusted only presuturally, along the *dc* rows and on a median patch), only 1 *ia* seta, mid and hind femora largely darkened, and vein 3 bare above.

### Females of *Dichaetomyia terraereginae* Malloch and *rufaeformis* sp. n.

Females of these species cannot be distinguished. According to the males studied, the species are allopatric so that females collected at the same localities as males are listed under each species above. Females collected without associated males could not be named and are listed below.

Characters such as the position of *prsc acr* setae and absence of auxiliary prostigmatal seta, and characters on the frons, are not apparently of any value in this sex and could not be used. Repeated study of external colour and structure, and of the structure of the ovipositor, failed to reveal any differences.

Several females in the series below lack the white spot of dust on the mesonotum at neck, and also lack the fine hairs on metepisternum.

Queensland: Bell Bird L'out, Lamington Nat. Park, 1 ♀, 30.v.1966 (*Z. Liepa*), CSIRO; Woombye, near Nambour, 1 ♀, 11–16.x.1965 (*D. H. Colless*), CSIRO; Mount Spec, 2 ♀, 22.iv.1955 (*K. R. Norris*), BMNH and CSIRO; Mingela, 2 ♀, 21.iv.1955 (*K. R. Norris*), BMNH and CSIRO; 63 miles N. of Marlborough, 1 ♀, 9.v.1955 (*K. R. Norris*), CSIRO; Currumbin, 2 ♀, 9.iv.1954 (*K. R. Norris*), CSIRO; 12 miles S. of Ingham, 2 ♀, 24.iv.1955 (*K. R. Norris*), CSIRO; 10 miles S. of Daintree, 1 ♀, 29.iv.1955 (*K. R. Norris*), CSIRO; 12 miles S. of Ravenshoe, 1 ♀, 4.v.1955 (*K. R. Norris*), CSIRO; Kalbar, 1 ♀, 5.v.1954 (*K. R. Norris*), CSIRO; Eungella, 2,400 ft., 1 ♀, 7.v.1955 (*K. R. Norris*), CSIRO; 5 miles W. of Tully, 1 ♀, 23.iv.1955 (*K. R. Norris*), CSIRO; Noosa Heads, 1 ♀, 21.ix.1963 (*D. E. Havenstein*), CSIRO; 50 miles W. of Miles, 1 ♀, 11.i.1963 (*D. E. Havenstein*), CSIRO; Lamington National Park, 1 ♀, 20.v.1964 (*R. A. McLachlan*), Bishop; Mt. Glorious, 1 ♀, 13.ii.1961 (*L. & M. Gressitt*), Bishop; Cape York Peninsula, Rocky R., N.E. of Coen, 500 m., 2 ♀, 1–2.v.1961 (*L. & M. Gressitt*), Bishop; Upper Mulgrave River, 10 m. Goldsborough Road, 3 ♀, 9.v.1967 (*D. H. Colless*), 1 BMNH, 2 CSIRO; 5 m. Tinaroo Falls–Danbulla

Road, at light, 1 ♀, 26.iv.1967 (*D. H. Colless*), CSIRO; Wongabel State Forest, 1 ♀, 7.v.1967 (*D. H. Colless*), CSIRO; Gillies Highway, 2 m. W. of Little Mulgrave, 1 ♀, 18.iv.1967 (*D. H. Colless*), CSIRO; 5–8 m. Mt. Lewis Road off Mossman–Mt. Mulloy Road, 1 ♀, 22.iv.1967 (*D. H. Colless*), CSIRO; Beaudesert, 1 ♀, 4.iii.1956, CSIRO; Claudie River near Mt. Lamond, 1 ♀, 5.vi.1966 (*D. K. McAlpine*), Aust. Mus.

NEW SOUTH WALES: Grafton, 1 ♀, 1926 (*W. W. Froggatt*), CSIRO; 4 miles S. of Coolongalook, near Nabiac, 1 ♀, 21.v.1966 (*Z. Liepa*), CSIRO; Manly Reservoir, Sydney, 1 ♀, 3.iv.1961, and 2 ♀, 21.vii.1963 (*D. H. Colless*), 1 BMNH, 2 CSIRO; North Coast Walloroo State Forest, 1 ♀, 10.x.1962 (*D. H. Colless*), BMNH; North Coast, Wootton, 1 ♀, 10.x.1962 (*D. H. Colless*), BMNH; 10 miles S. of Bateman's Bay, 1 ♀, 3.ix.1948 (*E. F. Riek*); CSIRO; Hawkesbury River, round human faeces, 1 ♀, 6.iv.1910 (*J. B. Cleland*), BMNH; Sydney, 1 ♀, 6.xi.1921, and 1 ♀, 23.x.1922 (Health Dept.), SPHTM; Sydney, 1 ♀, 5.xi.1926 (*Ferguson*), SPHTM; Hornsby, light trap, 1 ♀, 10.iv.1956 (*D. J. Lee*), SPHTM; Galston Gorge, W/A Trapping, 1 ♀, 12–15.viii.1963 (*J. H. Ardley*), SPHTM; Kuringai Chase, 2 ♀, 23–26.ix.1963 (*J. H. Ardley*), SPHTM; Kuringai Chase, W/A Trapping, 3 ♀, 3–6.vi and 15–18.vii.1963 (*J. H. Ardley*), SPHTM; Church Point, 1 ♀, 9.v.1959 (*I. F. B. Common*), CSIRO; Katoomba, 1 ♀, 8.i.1959 (*G. H. Hardy*), Aust. Mus.; National Park, 1 ♀, 6.viii.1955 (*D. K. McAlpine*), Aust. Mus.; Huonbrook near Mullumbimby, 1 ♀, 2.iii.1965 (*McAlpine & Lossin*), Aust. Mus.; Goulburn River, near Baerami, 1 ♀, 29.viii.1956 (*D. K. McAlpine*), Aust. Mus.; Wollombi, near Cessnock, 1 ♀, 27.viii.1956 (*D. K. McAlpine*), Aust. Mus.; Ballengarra State Forest, 2 ♀, 13.ii.1968 (*D. H. Colless*), CSIRO.

AUSTRALIAN CAPITAL TERRITORY: Black Mountain, light trap, 1 ♀, 14.iv.1956 (*I. F. B. Common*), CSIRO.

## ***Dichaetomyia megophthalma*** Malloch

*Dichaetomyia megophthalma* Malloch, 1925 : 325. Holotype ♂, QUEENSLAND: Cairns. In the United States National Museum, Washington. [Not examined.]
*Dichaetomyia megophthalma* Malloch; Lee, Crust & Sabrosky, 1956 : 324.

Diagnosis: *D. megophthalma* can be distinguished from all other species of the *vicaria*-group except for *terraereginae* and *rufaeformis* by the entirely black pteropleural setulae and the almost entirely black prosternal setulae, and by the absence of setulae on the ridge between inner postalar seta and scutellum (as in Text-fig. 2). In the male sex, *megophthalma* differs from both these species by the pale setulae on hypopleuron and sternite 1, and by the strong median *pv* setae on hind femur. Female unknown.

Malloch's original description of this species is as follows:

> " Male.—Head fuscous, face paler, antennae yellow, third segment brownish apically, palpi fuscous. Thorax yellow, the grey pruinescence when viewed from behind forming a broad vitta anteriorly which is separated from the outer one on each side by a narrow line mesad of the dorsocentrals. Abdomen yellow. Apices of tarsi very slightly darkened. Wings, calyptrae, and halteres yellow. Fine thoracic hairs yellow.

> " Frons reduced to a mere line; facets of eyes suddenly enlarged at middle, those of upper half in large part individually as large as anterior ocellus and distinctly wider than frons at middle. Dorso-centrals 2 + 4, all long; anterior intra-alar short. Hind femur with two or three preapical anteroventral bristles, and a series of fine bristles on basal half or more of posteroventral surface some of which are at least as long as diameter of femur; tibiae normal. Fourth vein curved.
>
> " Length, 5·5 mm.
>
> " Type, Cairns, North Queensland (J. F. Illingworth). "

This species is known only from the holotype in the USNM, which I have been unable to study. Mr. G. C. Steyskal however has studied it on my behalf, and was kind enough to locate the species in my draft key to the *vicaria*-group and to supply some additional notes. I am most grateful to him for the care taken in ensuring that accurate data on this species are published.

Distribution and biology: Known only from North Queensland (Cairns). Biology, life-history and immature stages unknown.

Affinities: This species is most closely related to the Micronesian species *mariana* Snyder, *yapensis* Snyder, *trukensis* Snyder and *saperoi* Bohart and Gressitt, all of which possess some *pv* setae in the basal half of hind femur in the male sex, and to the Samoan *fumicosta fumicosta* Malloch and *fumicosta savaii* Malloch. The data in my key above and Malloch's original description should be adequate for the recognition of *megophthalma*.

### *Dichaetomyia australis* sp. n.

(Text-figs. 8, 10, 12, 71, 74, 77)

Diagnosis: *D. australis* can be distinguished in the male sex from other Australian species of the *vicaria*-group with black and yellow pteropleural setulae by the enlarged upper inner eye-facets and by the long *pv* setae in basal half of hind femur (Text-fig. 8). The female can be distinguished from all other Australian species of the *vicaria*-group by the *pv* setae on hind femur (Text-fig. 12).

♂. *Head:* Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite strong, but not as long as anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with a few scattered setulae below the upper row that include some pale ones. Parafrontalia and parafacialia silvery white pruinose, face more thinly so; genae reddish in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia very slender, at lunula equal to diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula, obsolete on median half of frons and not even visible as a seam. 1 pair of inclinate *ori* at lunula, with 3–4 hair-like pairs above, all on lower two-fifths of frons; 0–1 pair of tiny reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow; 3rd segment white pruinose. 3rd segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which slightly exceeds length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia largely invisible; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin almost equal to width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending to level of about lower third of 3rd antennal segment. Mentum of proboscis dark brown. Palpi brown, tips sometimes paler; compressed, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum thinly but uniformly white dusted, with traces of undusted markings as follows: a pair of paramedian vittae before suture mesad of the *dc*; a pair of *prst* patches between *ph* and *dc*; and a pair of *post* vittae between *ia* and *dc*. Pleura virtually undusted. Spiracles pale yellow. Mesonotum with the ground-setulae short and numerous, especially between the *dc*, all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair quite strong, closer to each other than to the *dc*. All *dc* setae strong. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*, the anterior one fine. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae. Post-alar declivity with a few scattered pale hairs. Supra-squamal ridge bare. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with a dark auxiliary seta below; the former surrounded by few, the latter by numerous, setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with several setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one weaker than the anterior one and much closer to posterior one than to anterior one. Metathoracic spiracle moderate, rather oval, with a row of black setulae along lower margin. Squamopleuron with pale hairs. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically. *Legs:* Yellow; fore tibia brown, mid and hind tibiae and all tarsi black; tibiae and tarsi yellow in Cairns ♂. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur without *av* or *pv* setae except for the usual erect setulae basally and the *pv* in basal third; 1 *a* and 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with 3–4 preapical *av* setae; *ad* row complete; 1 *pd* preapical seta. Hind tibia with 1 *ad* and 1 weaker *av* setae; sometimes some of the *pd* ground-setulae more erect in apical half; *d* preapical seta subequal to tibial depth, shorter than the *ad*. *Wings:* Clear; the veins brown. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, with some inconspicuous pale hairs below. Small cross-vein placed basad of the point where vein 1 enters costa. Hind cross-vein oblique, strongly sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base extending a little way to small cross-vein. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae whitish, margins yellow, fringes pale. Knob of halteres yellow. *Abdomen:* Tergite 5 wholly dark, or yellow with a pair of black lateral spots. Sternites yellow. Macrochaetae poorly developed: tergite 4 with lateral discals, the marginal row interrupted medially; tergite 5 with a marginal row and some lateral discals. *Genitalia:* Text-figs. 71, 74, 77. *Measurements:* Length of body, 6·5 mm. Length of wing, 6·0 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, equal to 2nd *prst dc* seta, directed forwards and slightly outwards. The incurved *vti* not much longer than the outcurved *vte*; *pvt* outcurved, weak, about half length of *vte*. Parafrontalia silvery white pruinose on lower quarter only, otherwise grey pruinose, subshining black alongside ocellar tubercle; genae sometimes black in ground-colour, in which case grey pruinose. Interfrontalia, in mature specimens, black in ground-colour; viewed from below, greyish pruinose but rather brownish tinged on frontal triangle; frontal triangle otherwise visible as an ill-defined black streak extending half distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle equal to about twice diameter of anterior ocellus, at lunula broader than width of 3rd antennal segment. Interfrontalia with the margins convex, broadest at middle of frons, at lunula subequal to a parafrontale, bare. 3–4 pairs of inclinate *ori* on lower three-fifths of frons, only the lowest pair really strong, with a few interstitials; 2 pairs of reclinate *ors*, the upper pair twice as long as lower and placed closer to it than to *vti*; parafrontalia otherwise with short proclinate setulae on most of length. 3rd antennal segment weakly infuscated in apical half. Parafacialia slightly broader, opposite insertion of arista slightly broader than diameter of anterior ocellus. Beard often with rather numerous pale setae among the black ones. *Thorax:* Viewed from above and behind, mesonotum and scutellum undusted except on humeri. *Prsc acr* placed on the transverse level of *prsc dc*. Notopleuron with fewer setulae. Squamopleuron with some dark hairs. *Legs:* Yellow, fore tibia yellow, mid and hind tibiae and all tarsi brown to black. Mid femur with only 3–4 short *pv* setae in basal third, none as long as femoral depth. Hind femur with 2 preapical *av* setae, with a few longer setulae on this surface. *Wings:* Clear or rather yellowish tinged. Vein 3 bare above or with a setula on the node at base. Squamae yellowish. *Abdomen:* Colour as in male. Macrochaetae reduced and very weak. *Measurements:* Length of body, 6·5–7·0 mm. Length of wing, 6·0–6·5 mm.

Holotype ♂. QUEENSLAND: 6 miles N. of Kuranda, 11.i.1967 (*D. K. McAlpine & G. Holloway*), Aust. Mus.

Paratypes, 4 ♂, 9 ♀. QUEENSLAND: Bamaga, Cape York, 2 ♂, 1 ♀, 28.iii.1964 (*I. F. B. Common and M. S. Upton*), 1 ♂ BMNH, 1 ♂, 1 ♀, CSIRO; 1 ♀ (Brunetti Coll.), BMNH; Kuranda, 1 ♂, x.1910 (Brunetti Coll.), BMNH; Kuranda, 1,100 ft., 1 ♀, 3.v–20.vi.1913 (*R. E. Turner*), BMNH; Mt. Molloy, 1 ♀ (*F. H. Taylor*), SPHTM; Crystal Cascades, Cairns, 1 ♀, 19.iv.1967 (*D. H. Colless*), CSIRO; Whitfield Range Forest Reserve, Cairns, 1 ♀, 19.iv.1967 (*D. H. Colless*), CSIRO; Upper Mulgrave River, 10 m. Goldsborough Road, 1 ♀, 9.v.1967 (*D. H. Colless*), CSIRO; Kuranda, 350 m., rain forest, 1 ♂, 6.v.1961 (*L. & M. Gressitt*), Bishop; Mulgrave River 4 miles W. of Gordonvale, 2 ♀, 2 and 12.i.1967 (*D. K. McAlpine*), Aust. Mus.

Two females have rather aberrant features and may be either aberrant *australis* or *vicaria*, or hybrids between the two. Hind femur with a few *pv* setae in basal third, not as strong as in other females of *australis* but stronger than in *vicaria*, and with only the single *d* preapical seta of *vicaria*. The abdominal pattern is that described for *australis*. These are not paratypes of *australis*:

Not paratypes, QUEENSLAND: Iron Range, 1 ♀, 11.iv.1964 (*I. F. B. Common & M. S. Upton*), CSIRO; Lake Barrine, 1 ♀, 25.ix.1937 (*A. J. Turner*), Qld. Mus.

Distribution and biology: Australia: Queensland. A rare species.

This species occurs up to 350 m. and has been found exclusively in rain forest. Life-history and immature stages unknown.

Affinities: This species is very close to several species of the *vicaria*-group that also possess *pv* setae on hind femur and enlarged upper inner eye-facets in the male sex: *mariana* Snyder, *trukensis* Snyder and *saperoi* Bohart and Gressitt, all from Micronesia and known to me only from descriptions, and *fumicosta fumicosta* Malloch and *fumicosta savaii* Malloch, both from Samoa and known to me from material in the BMNH. *D. fumicosta* s.l. has proternal setulae yellow and pteropleural setulae as in *australis* (*savaii*) or entirely black (*fumicosta*); the wings are very conspicuously darkened, and the stem-vein has a few pale hairs on dorsal surface.

It differs from *megophthalma* Malloch by the characters given in the key and by the dark fasciae on abdominal tergites 3 and 4.

Discussion: The female from Kuranda (*Turner*) bears Malloch's determination label " Dichaetomyia decipiens Stein? ", but this record was not published. *Mydaea decipiens* was distinguished by Stein (1918 : 185) from *vicaria* (as *rufa* Stein) by the presence of *pv* setae on hind femur. This, and Malloch's discussion of *rufa* and *decipiens* (1929*b* : 171–172), account for this determination. My identification of the female of *australis* is based upon a small series of both sexes from the same population, and I have previously shown (Pont, 1968 : 169) that *decipiens* is a species of the Mydaeine genus *Papuaia* Malloch and not of *Dichaetomyia*.

### *Dichaetomyia vicaria* (Walker)

(Text-figs. 1, 9, 11, 13, 72, 75, 78)

*Aricia vicaria* Walker, 1859 : 130. Holotype ♀, KEY ISLAND (= KAI ISLAND). In the British Museum (Natural History), London. [Examined.]

*Spilogaster rufa* Stein, 1900*b* : 132. Lectotype ♂, NEW GUINEA: Friedrich Wilhelmshafen (= Madang). In the Zoologisches Museum der Humboldt-Universität zu Berlin. [Examined.] [Designation by Pont, in press.] **syn. n.**

*Dichaetomyia rufa* (Stein) Malloch, 1925 : 326.

*Dichaetomyia rufa* var. *personata* Bezzi, 1928 : 176. Lectotype ♂, FIJI: Suva. In the British Museum (Natural History), London. [See designation below.] **syn. n.**

*Dichaetomyia rufa* (Stein); Malloch, 1929*a* : 405.

*Dichaetomyia rufa* (Stein); Malloch, 1929*b* : 169–172.

*Dichaetomyia rufa* var. *personata* Bezzi; Malloch, 1929*b* : 170–172.

*Dichaetomyia rufa* (Stein); Lee, Crust & Sabrosky, 1956 : 332.

*Dichaetomyia rufa* (Stein); Snyder, 1965 : 301.

*Dichaetomyia vicaria* (Walker) Pont, 1966*a* : 98.

*Dichaetomyia rufa* (Stein); Given, 1968 : 42.

*Dichaetomyia rufa* (Stein); Pont, in press.

*Lectotype designation for var.* personata *Bezzi*. Bezzi described his *rufa* var. *personata* from " Type ♂ and ♀, Suva, 8.ix.1920 (*H. W. Simmonds*), Natova, Nadi, ix.1914 (*R. Veitch*) ". This statement does not restrict the name to one specimen, and so lectotype designation is necessary. I have labelled, and designate herewith, the male from Suva as LECTOTYPE and the female from Natova, Nadi, as paralectotype. Both specimens are in the BMNH. A male syntype from Natova in Milan has been labelled as paralectotype.

Diagnosis: *D. vicaria* can be distinguished from the other Australian species of the *vicaria*-group with black and yellow pteropleural setulae by the absence of *pv* setae on hind femur, the ground-setulae never exceeding half femoral depth (Text-figs. 9 and 13) and by the absence of dark fasciae on tergites 3 and 4.

♂. *Head:* Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite strong, but not as long as anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row that usually include some pale ones, sometimes entirely black. Parafrontalia and parafacialia silvery white pruinose, face more thinly so; genae reddish to black in ground-colour, brownish grey to grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to just under twice diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula, visible as a line or even obsolete on median third of frons. 2–3 pairs of inclinate *ori*, only the lowest pair really strong, with several hair-like interstitials, all on lower two-fifths of frons; 1 pair of hair-like reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow; 3rd segment white pruinose. 3rd antennal segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which equals or slightly exceeds length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to just over diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafacialia and parafrontalia visible though slender; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to slightly less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending to level of about lower third of 3rd antennal segment. Mentum of proboscis brown. Palpi usually wholly brown, sometimes yellow in apical half and only weakly infuscated in basal half; compressed, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum whitish dusted, more densely so before suture, with a pair of slender undusted paramedian vittae before suture, mesad of the *dc*, continued a short distance behind suture, a pair of undusted *prst* patches between *ph* and *dc*, and a pair of weakly dusted *post* vittae between *ia* and *dc*. Pleura virtually undusted. Spiracles pale yellow. Mesonotum with the ground-setulae short and numerous, especially between the *dc*, all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair quite strong, closer to each other than to the *dc*. All *dc* setae strong. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*, the anterior one short and fine, sometimes absent. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae. Post-alar declivity with a few scattered pale hairs. Supra-squamal ridge bare, in some specimens with some dark or pale setulae at anterior (outer) end, near wing-base; this area often obscured by the wing. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with a well-developed black auxiliary seta below; the former surrounded by few, the latter by numerous, setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with several pale or dark setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one weaker than anterior one, occasionally subequal to it, and much closer to posterior one than to anterior one. Metathoracic spiracle moderate, subtriangular, with a row of black setulae along lower margin. Squamopleuron with a number of dark, dark and pale, or pale hairs. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically. *Legs:* Yellow, tarsi brown; fore tibia yellow, mid tibia dull yellow, hind tibia brown, or mid and hind tibiae dull yellow or brown, or all tibiae yellow. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur without *av* or *pv* setae; 1 *a* and 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with *av* surface bare except, in apical two fifths, for 1–3 strong setae that are as long as femoral depth and 2–3 weak short ones before them; *ad* row complete; 1 *pd* preapical seta. Hind tibia with 1(–2) *ad* and 1–2 *av* setae; sometimes some of the *pd* ground-setulae more erect in apical half; *d* preapical seta subequal to tibial depth, shorter than the *ad*. *Wings:* Very weakly yellow tinged, sometimes quite strongly so basally and costally; the veins pale. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein with a few fine pale inconspicuous hairs on lower, and often also on basal part of upper, surfaces. Small cross-vein placed basad to apicad of the point where vein 1 enters costa. Hind cross-vein oblique, strongly sinuate. Vein 1 bare. Vein 3 bare or with 1 setula on the node at base above; below with a few setulae on the node at base and just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae pale yellow to yellow. Knob of halteres pale yellow. *Abdomen:* Ground-colour yellow, most of tergites 4 and 5 usually discoloured by post-mortem decay. Sternites yellow. Macrochaetae quite well developed: tergite 3 with some lateral marginals, tergites 4 and 5 each with a complete marginal row, tergite 4 with some lateral discals, and tergite 5 with a discal row. *Genitalia:* Text-figs. 72, 75, 78. *Measurements:* Length of body, 6·0–7·0 mm. Length of wing, 5·5–6·5 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, equal to 2nd *prst dc* seta, directed forwards and slightly outwards. The incurved *vti* not much longer than the outcurved *vte*; *pvt* outcurved, about half length of *vte*. Parafrontalia silvery white pruinose on lower third only, otherwise grey pruinose, subshining black alongside ocellar tubercle. Interfrontalia black in ground-colour, sometimes reddish towards lunula; viewed from below, grey pruinose but weakly brownish tinged on frontal triangle; frontal triangle otherwise visible as an ill-defined black streak extending a little over half distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle equal to about twice diameter of anterior ocellus, at lunula broader than width of 3rd antennal segment. Interfrontalia with the margins convex, broadest at middle of frons, at lunula slightly broader than a parafrontale, bare. 3–4 pairs of inclinate *ori* on lower half of frons, only the lowest pair really strong, with few interstitials; 2 pairs of reclinate *ors*, the upper pair twice as long as lower and placed closer to it than to *vti*; parafrontalia otherwise with short proclinate setulae on most of length. 3rd antennal segment infuscated in apical half. Parafacialia slightly broader, opposite insertion of arista slightly broader than diameter of anterior ocellus. *Thorax:* Viewed from above and behind, mesonotum and scutellum undusted except on humeri. Anterior *ia* sometimes absent. Notopleuron with fewer setulae, occasionally a few pale ones, sometimes almost absent. Hypopleuron sometimes without the pale hairs below spiracle. *Legs:* Mid femur without denser erect *av* and *pv* ground-setulae, in basal half with a few short *pv* setae that are not more than half femoral depth. Hind femur with 1–2 strong and 1–2 weak *av* setae in apical third. *Wings:* Stem-vein with the dorsal hairs often hardly discernible. *Abdomen:* Colour as in male. Virtually undusted in posterior view, even on the darkened areas, but appearing matt. Macrochaetae reduced, weak, confined to lateral parts of tergites. *Measurements:* Length of body, 5·5–7·0 mm. Length of wing, 5·0–6·5 mm.

Material examined. Holotype ♀ of *vicaria*. KEY ISLAND (= KAI ISLAND) (*A. R. Wallace*), BMNH.

Lectotype ♂ of *rufa*, N.E. NEW GUINEA: Friedrich Wilhelmshafen (= Madang), 1896 (*L. Biró*), ZMB.

Lectotype ♂ of *rufa* var. *personata*, FIJI ISLANDS: Suva, 8.ix.1920 (*H. W. Simmonds*), BMNH.

TORRES STRAIT: St. Paul Moa Is., 1 ♂, 12.ii.1962 (*D. W. Lavers*), CSIRO; Saibai Is., 1 ♀, 10.ii.1962 (*D. W. Lavers*), CSIRO.

NORTHERN TERRITORY: 4 mile Marrakai, 1 ♂, 13.ix.1933 (*T. G. Campbell*), CSIRO; Humpty Doo, 1 ♀, 2.iv.1959 (*I. F. B. Common*), CSIRO; Darwin Harbour, 1 ♀, 14.vi.1964 (*K. R. Norris*), CSIRO; Brock's Creek, 1 ♀, i.1933 (*T. G. Campbell*), CSIRO; Bill's Point, Mary River, 1 ♀, 3.viii.1929 (*I. M. Mackerras and T. G. Campbell*), CSIRO; Brock's Creek, 1 ♀, 8.iii.1933 (*F. Don*), CSIRO; East Point, Darwin, 1 ♂, 1 ♀, 12.vi.1964 (*K. R. Norris*), CSIRO; Howard Springs, 12 ♂, 15 ♀, 12.vi.1964 (*K. R. Norris*), 3 ♂, 4 ♀ BMNH, 9 ♂, 11 ♀ CSIRO; Burnside, attracted to and feeding in human excrement, 1 ♂, 28.iii.1929 (*T. G. Campbell*), CSIRO; Brock Creek, Burnside, 1 ♀, 29.iii.1929 (*T. G. Campbell*), CSIRO; Katherine, 2 ♂, 6 ♀, 15–16.x.1950 (*W. Arndt*), 2 ♀ BMNH, 2 ♂, 4 ♀ CSIRO; Darwin, 1 ♂ (*G. F. Hill*), S.A. Mus.; Koolpinah, 4 ♀ (*G. F. Hill*), S.A. Mus.; Batchelor, 1 ♀ (*G. F. Hill*), Vict. Mus.; Crocodile Islands, 7 ♀, 28.xi.1924 (*G. H. Wilkins*), BMNH; Arnhem Land, Maningrida, 1 ♂, 20–21.iii.1961 (*L. & M. Gressitt*), Bishop; Arnhem Land, Maningrida, 5 m., Malaise-trap, 1 ♂, 2 ♀, 17.iii.1961 (*J. L. & M. Gressitt*), Bishop; Holmes Jungle, Palm Creek, 15 km. N.E. of Darwin, 5 m., light trap, 1 ♀, 11.iii.1961 (*J. L. & M. Gressitt*), Bishop; Darwin, 1 ♂, 8 ♀, 21.iv.1965 (*D. E. Havenstein*), 2 ♀ BMNH, 1 ♂, 6 ♀ CSIRO.

QUEENSLAND: Ayr, 2 ♂, 2 ♀, 4.ix.1950 (*E. F. Riek*), CSIRO; Mt. Bartle Frere, East base, 80 ft., 1 ♂, 24.iv.1955 (*K. R. Norris*), CSIRO; 12 miles S.E. of Bowen, 1 ♀, 6.v.1955 (*K. R. Norris*), CSIRO; 4 miles S. of Atherton, 1 ♀, 2.v.1955 (*K. R. Norris*), CSIRO; Yeppoon, 1 ♀, 10.v.1955 (*K. R. Norris*), CSIRO; Kairi, 1 ♀, 2.v.1955 (*K. R. Norris*), CSIRO; 8 miles E. of Netherdale, 1 ♀, 6.v.1955 (*K. R. Norris*), CSIRO; Kuranda, 1 ♂, 17.v.1958 (*D. K. McAlpine*), Aust. Mus.; River Bank, rain forest, Silkwood, Innisfail District, 1 ♀, 25.v.1958 (*D. K. McAlpine*), Aust. Mus.; Bramston Beach, near Innisfail, open savannah, 1 ♀, 30.iv.1967 (*D. H. Colless*), CSIRO; Springsure, 1 ♀, 2.iii.1965 (*D. E. Havenstein*), CSIRO; Kuranda, 1 ♀, 21.viii.1951 (*A. H. Wetherley*), CSIRO; 14 miles S.W. of Sarina, 4 ♂, 1 ♀, 8.v.1955 (*K. R. Norris* and *Norris & Common*), 1 ♂, 1 ♀ BMNH, 3 ♂ CSIRO; Ingham, 2 ♂, 1 ♀, 11.vii.1959 (*K. L. Harley*), CSIRO; Ingham, trapped over dead cattle ticks, 5 ♂, 2 ♀, 9–13.vii.1959 (*K. L. Harley*), 1 ♂ BMNH, 4 ♂, 2 ♀ CSIRO; Ingham, trapped over dead cattle ticks, 3 ♂, 3 ♀, 14.vii.1959 (*K. L. Harley*), 1 ♂, 1 ♀ BMNH, 2 ♂, 2 ♀ CSIRO; Ingham, 1 ♀, 13.iii.1958 (*K. L. Harley*), CSIRO; Ingham, 4 ♀, 22.v.1958 (*K. L. Harley*), 1 ♀ BMNH, 3 ♀ CSIRO; Ingham, light trap, 1 ♀, 3.v.1961 (*R. Straatman*), CSIRO; Cannonvale, near Proserpine, 1 ♂, 24.vi.1958 (*T. G. Campbell*), CSIRO; Innisfail, 1 ♂, 21.iv.1958 (*T. G. Campbell*), CSIRO; Rockhampton, 1 ♂, 6 ♀, 19.ix.1963 (*D. E. Havenstein*), 2 ♀ BMNH, 1 ♂, 4 ♀ CSIRO; Redlynch, 2 ♂, 4 ♀, 14.viii.1938, and 4♂, 1♀, 10–17.viii.1938 (*R. G. Wind*), BMNH; Burpengary, 1♀ (*T. L. Bancroft*), BMNH; Cairns, ex corn, 1 ♂ (*A. P. Dodd*), USNM; Mt. Glorious, 2 ♀, 13.ii.1961 (*L. & M. Gressitt*), BMNH and Bishop; Hambledon, 1 ♀, xii.1921 (*Pemberton*), Bishop; Cairns, ex corn, 2 ♂ (*J. F. Illingworth*), BMNH and Bishop; Cairns, coll ex cage, 1 ♂, 1 ♀ (*J. F. Illingworth*), Bishop; Cairns, coll ex window, 1 ♂ (*J. F. Illingworth*), Bishop; Cairns, coll. ex castor oil plant, 1 ♀ (*J. F. Illingworth*), Bishop; Brisbane, in house, 1 ♂ (*A. J. Turner*), SPHTM; Townsville, 1 ♀ (*Taylor*), SPHTM; Big Mitchell Creek, Mareeba-Molloy Road, 1 ♂, 4.v.1967 (*D. H. Colless*), CSIRO; Hyacinth Pool, Ingham, 2 ♂, 27.viii.1955, CSIRO; Earl Hill, N. of Cairns, 1 ♀, 8.v.1967 (*D. H. Colless*), CSIRO; Jungle swamp, Vorkey's Knob, near Cairns, 1 ♀, 20.viii.1955, CSIRO.

AMBOINA IS. (= AMBON IS.): 1 ♂ (*F. Muir*), Bishop.

BURU IS.: Station I, 2 ♀, 13.xii.1921 and 8.i.1922 (*L. J. Toxopeus*), Amsterdam [det. by Malloch as *rufa*].

WEST IRIAN: Vogelkop, Fak Fak, S. coast of Bomberai, 10–100 m., 1 ♂, 11.vi.1959 (*T. C. Maa*), Bishop; Vogelkop, Manokwari, 75 m., 1 ♂, 20.vii.1957 (*D. E. Hardy*), Bishop; Hollandia, 1 ♀, 24.i.1960 (*T. C. Maa*), Bishop; Eramboe, 8 km. ex Merauke, 1 ♀, 5.ii.1960 (*T. C. Maa*), Bishop; Hollandia, 1 ♂, vii.1957 (*G. den Hoed*), Amsterdam.

N.E. NEW GUINEA: Morobe District, Lae area, Busu River Forest, 1 ♂, 17.vi.1965 (*R. W. Crosskey*), BMNH; Madang District, near Madang, 1 ♂, 9–14.vi.1965 (*R. W. Crosskey*), BMNH; Dreikikir, Sepik District, 350 m., Malaise-trap, 1 ♂, 23.vi.1961 (*J. L. & M. Gressitt*), BMNH; Wampit V., near Gurakor Village, 950 m., near Wau, 1 ♂, 7.vii.1957 (*D. E. Hardy*), BMNH; Maprik, 150 m., 1 ♂, 29.xii.1959–17.i.1960 (*T. C. Maa*), Bishop; May R./Patrol Station, 100 m., swept near stream, 1 ♀, 30.v.1963 (*R. Straatman*), Bishop; Lae., 1 ♀, vii.1944 (*F. E. Skinner*), Bishop; Aitape, 3 ♂, 4 ♀ (*F. H. Taylor*), SPHTM; Wau, Morobe District, 1,200 m., Malaise-trap, 1 ♂, 14.vi.1961 (*J. L. Gressitt*), Bishop; Wau, Morobe District, 1,100 m., 1 ♂, 19.ix.1961 (*J. Sedlacek*), Bishop; Wau, Morobe District, 1,200 m., M.V. Light Trap, 1 ♀, 7–16.xii.1961 (*J.

*Sedlacek*), Bishop; Wau, Morobe District, 1,200 m., M.V. Light Trap, 1 ♀, 26–29.ix.1961 (*J. Sedlacek*), Bishop; Lae, 10 m., 2 ♂, 6.vii.1957 (*D. E. Hardy*), BMNH and Bishop; Lae, 10 m., 2 ♂, 1 ♀, 10.vii.1957 (*D. E. Hardy*), Bishop; Lae, Bubia Agric. Sta., 15 m., 1 ♀, 6.vii.1957 (*D. E. Hardy*), Bishop; Finsch Haven, 4 ♀ (*L. Wagner*), 1 BMNH, 3 S.A. Mus.; Lae, 1 ♀, 24.xii.1963 (*D. K. McAlpine*), Aust. Mus.; Kandanggei, Sepik River, 1 ♂, 2.iii.1964 (*D. H. Colless*), CSIRO; Angoram, Sepik River, 1 ♂, x.1959 (*R. Pullen*), CSIRO.

Papua: Mafulu, 4,000 ft., 1 ♂, xii.1933 (*L. E. Cheesman*), BMNH; Cape Rodney, Malaise-trap, 2 ♂, 3 ♀, 2–4.xi.1960 (*J. L. Gressitt*), 1 ♀ BMNH, 2 ♂, 2 ♀ Bishop; Cape Rodney, Malaise-trap, 1 ♀, 2.xi.1960 (*J. L. Gressitt*), Bishop; Cape Rodney, 10 m., Malaise-trap, 1 ♀, 2–4.xi.1960 (*J. L. Gressitt*), Bishop; Central District, Otomata Plantation, 1 mile E. of Moresby, Malaise-trap, 2 ♂, 1 ♀, 2.xi.1960 (*J. L. Gressitt*), 1 ♂ BMNH, 1 ♂, 1 ♀ Bishop; Central District, Otomata Plantation, 1 mile E. of Moresby, Malaise-trap, 1 ♀, 9.30–18.00 (*J. L. Gressitt*), BMNH; Kapogere, near Rigo, 1 ♂, 1 ♀, 14–19.v.1959 (*C. D. Michener*), Bishop; West District, Oriomo Govt. Sta., Malaise-trap, 1 ♀, 26–28.x.1960 (*J. L. Gressitt*), Bishop; Normanby Is., Wakiuna, Sewa Bay, 1 ♀, 25–30.x.1956 (*W. W. Brandt*), BMNH; Port Moresby, Boroko, Malaise-trap, 1 ♂, 6–7.xi.1960 (*J. L. Gressitt*), Bishop; Central District, Kapogere, 60 miles S.E. of Port Moresby, 4 ♀, 2.v.1965, and 1 ♀, 4.v.1965 (*R. W. Crosskey*), BMNH; Moitaka, Port Moresby, in trap, 4 ♂, 4 ♀, iii.1962 (*K. R. Norris*), 1 ♂, 1 ♀ BMNH, 3 ♂, 3 ♀ CSIRO; Moitaka, Port Moresby, 1 ♂, iii.1962 (*K. R. Norris*), CSIRO; West District, Maderi Plantation, 1 ♂, x.1961 (*M. G. Meadows*), CSIRO.

Bismarck Archipelago: New Britain, Linden, 1 ♂ (*Heydon*), S.A. Mus.; Rabaul, on damaged corn cobs, 1 ♂, 18.vi.1941 (*J. L. Froggatt*), BMNH; Keravat, 1 ♂, 15.v.1941 (*J. L. Froggatt*), BMNH; Keravat, 1 ♀, 4–5.vii.1965 (*R. W. Crosskey*), BMNH; Keravat, 1 ♀, 23.vii.1953 (*G. S. Dun*), BMNH; Malmalwan-Vunakanau, Gazelle Peninsula, 2 ♀, 5–12 & 14.v.1956 (*J. L. Gressitt*), Bishop; south of Cape Hoskins Aerodrome, 8 ♂, 1 ♀, 6.vii.1962 (Noona Dan Exped. 1961–62), 2 ♂ BMNH, 6 ♂, 1 ♀ Copenhagen; Valoka, 1 ♂, 8.vii.1962 (Noona Dan Exped. 1961–62), Copenhagen; Yalom, 1,000 m., 4 ♂, 8.v.1962, 4 ♂, 10.v.1962, 1 ♀, 13.v.1962, and 1 ♀, 20.v.1962 (Noona Dan Exped. 1961-2), 2 ♂ BMNH, 6 ♂, 2 ♀ Copenhagen. New Ireland, " Camp Bishop ", 12 km. up Kait River, 240 m., 1 ♂, 10.vii.1956 (*E. J. Ford*), Bishop; Gilingil Plain, 2 m., 2 ♀, 6.vii.1956, light trap, 1 ♀, 4.vii.1956, and 1 ♀, 5.vii.1956 (*J. L. Gressitt*), 1 BMNH, 3 Bishop; Lemkamin, 1 ♂, 11.iv.1962 (Noona Dan Exped. 1961–62), Copenhagen; Danu, Kalili Bay, 7 ♂, 2 ♀, 29.iv.1962 (Noona Dan Exped. 1961–62), 2 ♂, 1 ♀ BMNH, 5 ♂, 1 ♀ Copenhagen. Manus Is., Lorengau, 1–75 m., 1 ♂, 28.vi.1959 (*J. L. Gressitt*), BMNH. Lavongai, Banatam, caught in Malaise-traps, 2 ♀, 25.iii.1962, and 1 ♀, 19.iii.1962 (Noona Dan Exped. 1961–62), 1 BMNH, 2 Copenhagen. Mussau Is., Boliu, 2 ♂, 3.vi.1962 (Noona Dan Exped. 1961–62), Copenhagen; Malakata, 2 ♂, 9.vi.1962 (Noona Dan Exped. 1961–62), BMNH and Copenhagen. Duke of York, Manuan, 4 ♂, 4 ♀, 18.vii.1962 (Noona Dan Exped. 1961–62), 1 ♂, 1 ♀ BMNH, 3 ♂, 3 ♀ Copenhagen.

Louisiade Archipelago: Misima Island, 1 ♀ (*R. J. Andrew*), S.A. Mus.

Solomon Islands: 1 ♀, vii–viii.1909 (*Froggatt*), CSIRO; Bougainville (S.), Kieta, 1 ♂, 26.xi.1959 (*T. C. Maa*), Bishop; Kolombangara Is., Kukundu, S.W. coast, 1–12 m., ex fresh human excrement, 1 ♂, 8–11.vii.1959 (*J. L. Gressitt*), Bishop; Kolombangara Is., 1–12 m., 1 ♂, 8.vii.1959 (*J. L. Gressitt*), Bishop; Vella Lavella, Kundurumbangara, 80 m., Malaise-trap, 1 ♂, 23.xi.1963 (*J. L. Gressitt*), Bishop; Vella Lavella, Pusisama, Malaise-trap, 1 ♂, xi.1963, and 1 ♀, 25.xi.1963 (*P. Shanaham*), ♂ BMNH, ♀ Bishop.

NEW HEBRIDES: Pentecost Is., 1 ♂, 20.vi.1925 (*P. A. Buxton*), BMNH; Espiritu Santo, Hog Harbour, 1 ♀, viii.1925 (*P. A. Buxton*), BMNH; Malekula, 1 ♀, 14.vi.1925 (*P. A. Buxton*), BMNH; Malekula, Ounua, 2 ♀, ii & iii–iv.1929 (*L. E. Cheesman*), BMNH.

FIJI IS.: Natova, Nadi, 1 ♀, ix.1914 (*R. Veitch*), BMNH, paralectotype of *personata*; Natova, 1 ♂ (*R. Veitch*), Milan, paralectotype of *personata*; Suva, 1 ♀, 24.iii.1924 (*H. W. Simmonds*), BMNH; Ovalau, 2 ♀ (*A. M. Lea*), S.A. Mus.; Taveuni, 1 ♀, May (*A. M. Lea*), S.A. Mus.; 1 ♂, 1913 (*J. F. Illingworth*), Bishop; Kadavu, 1 ♀ (*R. A. Gibbons*), SPHTM.

SAMOA: Apia, Upolu, 1 ♂, 3.iii.1924 (*P. A. Buxton & G. H. E. Hopkins*), BMNH [det. by Malloch as *rufa*]; Apia, Upolu, 1 ♂, 9.vi.1924 (*Buxton & Hopkins*), BMNH; Apia, 1 ♂, 19.ii.1923 (*J. S. Armstrong*), BMNH.

TONGA: Fofoa Is., in trap baited with decaying meat, 2 ♀, 29.iv.1949 (*B. A. O'Connor*), BMNH; Vavan, 1 ♀ (*C. L. Edwards*), BMNH.

Distribution and biology: Australia: Torres Strait (St. Paul Moa and Saibai Is.), Northern Territory, Queensland. Kai Is., Ambon Is., Buru Is., New Guinea (West Irian, N.E. New Guinea, Papua), Bismarck Archipelago, Louisiade Archipelago, Solomon Is., New Hebrides, Fiji, Samoa, Tonga. Also recorded from Micronesia (Snyder, 1965 : 301) and Niue Is. (Given, 1968 : 42).

In Australia this is the most abundant and generally distributed species of *Dichaetomyia*, occurring from sea-level to 330 m. It is most commonly found in rain forest, even in narrow riverine rain forest in dry savannah or residual rain forest in agricultural land, but is also found less commonly in eucalyptus forest, open savannah or open country, even near the sea-shore. It has been collected on corn, castor oil plants, dead cattle ticks and human excrement, and has been found indoors. It has been trapped in Malaise-traps, light traps, and carrion-baited blowfly traps.

In New Guinea it occurs up to 1,300 m., and has been caught in Malaise-traps and blowfly traps. In New Britain it occurs up to 1,000 m. and has been found on damaged corn cobs. In the Solomon Islands it has been found on human excrement, and in Tonga in a fly-trap baited with rotten meat. Life-history and immature stages unknown.

Variation: *D. vicaria* is remarkably constant in colour and structure throughout its range. The following notes are based on all the material studied (over 300 specimens).

The beard and post-ocular setulae are sometimes almost entirely black in non-Australian populations. The palpi only rarely have more than the tips yellow. The anterior *ia* seta is always poorly developed, and may be absent on one side or totally absent. The anterior (outer) end of the supra-squamal ridge, near wing-base, sometimes bears setulae, as in the subgenus *Eumusca* Townsend of *Musca* Linnaeus, but this character is not even of specific value in *Dichaetomyia*. These setulae may be black, as in the lectotype of *rufa* Stein, or pale. The hairs below spiracle on hypopleuron are sometimes absent in the female. The colour of the tibiae varies between yellow and brown even within the same population. In the male, the mid femur may have some short but distinct setae among the *pv* ground-setulae near base, and the hind femur also may have a few stronger *pv* setulae around middle. The stem-vein often has a few fine pale inconspicuous hairs on basal part of upper wing-surface.

Discussion: Malloch was always in some doubt as to the identity of this species (1929*b* : 171–172) but his identification has been checked and found to be correct: the male from Apia, Samoa, 3.iii.1924, to which he refers as *rufa*, is in the BMNH and is conspecific with the species discussed here as *vicaria*. I have also studied the two females from Buru (1929*a* : 405) doubtfully referred by Malloch to *rufa*, and find these identifications to be correct.

Bezzi (1928 : 176) described his var. *personata* as differing from typical *rufa* by the dark palpi and black interfrontalia. These characters are in my opinion of no importance in this species and vary according to the degree of maturation. His four syntypes possess the characters of *vicaria* and I have no hesitation in placing his name in synonymy.

Snyder (1965 : 301–303) has redescribed this species, as *rufa*, from Micronesian material. His identification is probably correct, but he does not mention any pale setulae among the pteropleurals; he writes " scutellar setulae descend scarcely on to lateral margins ", whereas I find that there are usually 5–7 (range 3–9); he writes " occasionally with one or more short hairs on pleuratergite [= squamopleuron] ", whilst I have found such hairs to be invariably present, usually numerous, either dark or pale and dark or pale.

I have seen the specimens recorded by Stein (1920 : 80) from the islands of Waigeo and Seram, and do not consider them to be this species.

Affinities: *D. vicaria* is closely related to the other species of this group, but can be clearly separated by the shape of the male 5th sternite, with its characteristic deep median notch on the surface between the lobes, and by the absence of *pv* setae on hind femur. Females may sometimes be confused with females of *flavohirta* and *reversa* with a few brownish pteropleural setulae on sub-alar ridge, but can be distinguished from these species by the absence of the median spot of white dust on the mesonotum at neck.

## ***Dichaetomyia flavohirta*** Malloch

(Text-figs. 14, 17, 20, 79, 82, 85)

*Dichaetomyia flavohirta* Malloch, 1925 : 326. Holotype ♂, QUEENSLAND: Cairns. In the United States National Museum, Washington. [Not examined.]
*Dichaetomyia flavohirta* Malloch; Lee, Crust & Sabrosky, 1956 : 317.

Note on type-location: Malloch described this species from the male holotype, female allotype, and 7 ♂, 6 ♀ paratypes, all from Cairns; and 1 ♂ paratype, from Townsville. Lee, Crust & Sabrosky (l.c.) give the location of this material as follows: holotype USNM, allotype USNM, 3 paratypes USNM, 2 paratypes SPHTM.

I was unable to study the holotype, but Mr. G. C. Steyskal kindly checked its identity against my draft key to the *vicaria*-group, and I have also studied two paratypes from Cairns (USNM) and the paratype from Townsville (SPHTM). In the Bishop Museum and the BM there are 6 ♂ and 7 ♀ of this species collected at Cairns by Illingworth. Some, but not all, of these are paratypes.

Diagnosis: *D. flavohirta* can be distinguished from the other Australian species of the *vicaria*-group with entirely yellow pteropleural and prosternal setulae in the male sex by the conspicuously enlarged upper inner eye-facets and linear frons, and in the female sex by the stronger and more numerous *av* setae on hind femur (Text-fig. 20).

♂. *Head:* Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite weak, a little over half length of anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row that include some pale ones. Parafrontalia, parafacialia and face silvery white pruinose; genae reddish in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia very slender, at lunula equal to diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula. 1 pair of strong inclinate *ori* at lunula, with 5–6 moderate to hair-like pairs above them, all on lower two-fifths of frons; 1 pair of hair-like reclinate *ors* just before ocellar tubercle. Antennae and basal half of arista yellow; 3rd segment white pruinose. 3rd segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which slightly exceeds length of 3rd antennal segment. Parafacialia and genae bare. In lateral view, vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to slightly less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with only 1–2 short hairs above the usual cluster of setulae at vibrissal angle. Mentum of proboscis dark brown. Palpi dull yellowish to brown; compressed, slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum whitish dusted, more densely so before suture, with a pair of slender undusted paramedian vittae before suture mesad of the *dc*, sometimes continued a short distance behind suture, a pair of undusted *prst* patches between *ph* and *dc*, and a pair of weakly dusted *post* vittae between *ia* and *dc*. Scutellum thinly dusted, more densely so in basal lateral corners, usually virtually undusted in apical half. Pleura virtually undusted. Spiracles pale yellow. Mesonotum with the ground-setulae rather fine and erect, dense between the *dc*, black unless otherwise stated; pleural ground-setulae pale unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair strong, closer to each other than to the *dc*. All *dc* setae strong. 2 *h*, the outer one not much longer than the inner one, with a 3rd (inner) seta. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*, the anterior one fine, sometimes absent. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae. Post-alar declivity with a few scattered pale hairs. Supra-squamal ridge bare. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with a well-developed black auxiliary seta below; the former surrounded by few, the latter by numerous setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with several setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on subalar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one weaker than anterior one and much closer to posterior one than to anterior one. Metathoracic spiracle moderate, subtriangular, with a few black setulae on lower margin. Squamopleuron with a number of fine pale hairs. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather fine setulae, a few stronger ones apically. *Legs:* Yellow; all tarsi brown to black, metatarsi sometimes yellowish. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur with or without a few long fine *pv* setae in basal third, as long as femoral depth, otherwise without *av* or *pv* setae except for the usual erect ground-setulae in basal half; 1 *a* and 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with the *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 strong *ad* and 1–2 weaker *av* setae; some of the *pd* ground-setulae more erect in apical half; *d* preapical a little longer than tibial depth, shorter than the *ad*. *Wings:* Rather yellowish, especially at base; the veins brownish. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, with a few pale hairs below. Small cross-vein placed below the point where vein 1 enters costa. Hind cross-vein oblique, strongly sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base and just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae and margins pale yellow, fringes pale. Knob of halteres yellow. *Abdomen:* Ground-colour of tergites and sternites yellow, the apical tergites sometimes discoloured. In posterior view, tergites with some whitish dust, with a narrow undusted median vitta. Macrochaetae quite strong and erect: tergite 3 with some lateral marginals, tergite 4 with several lateral discals and a marginal row, tergite 5 with a marginal and partially double discal row. *Genitalia:* Text-figs. 79, 82, 85. *Measurements:* Length of body, 6·0–7·0 mm. Length of wing, 5·5–6·5 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, slightly longer than anterior *prst dc* seta, directed forwards and slightly outwards. The incurved *vti* one and a half times as long as the outcurved *vte*; *pvt* outcurved, almost as long as *vte*. Parafrontalia silvery white pruinose on lower third, otherwise grey pruinose, subshining black alongside ocellar tubercle. Genae sometimes black in ground-colour, in which case grey pruinose. Interfrontalia black in ground-colour; viewed from below, grey pruinose with the frontal triangle tinged with brownish; frontal triangle otherwise visible as an ill-defined black streak extending three-quarters distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle equal to almost twice diameter of anterior ocellus, at lunula broader than width of 3rd antennal segment. Interfrontalia with the margins convex, broadest at middle of frons, at lunula slightly broader than a parafrontale, bare. 4 pairs of inclinate *ori* on lower three-fifths of frons, only the lowest pair really strong, with few interstitials; 2 pairs of reclinate *ors*, the lower pair a little over half length of upper pair, upper pair closer to lower than to *vti*; parafrontalia otherwise with short proclinate setulae on most of length. Parafacialia slightly broader, opposite insertion of arista slightly broader than diameter of anterior ocellus. In lateral view, parafrontalia and parafacialia visible but slender. *Thorax:* Viewed from above and behind, mesonotum and scutellum undusted except for a small median patch of white dust at neck. Anterior *ia* seta sometimes vestigial, or rarely absent. Anterior prosternal setulae sometimes brownish. Prostigmatal and propleural ground-setulae all pale. Hypopleuron sometimes bare below spiracle. Scutellum with 0–1 setulae below the level of the strong setae. *Legs:* Mid femur without denser erect *av* and *pv* ground-setulae in basal half, without *v* setae except for 2–3 short *pv* setae. Hind femur without *pv* setae. *Wings:* Vein 3 sometimes with a setula above on the node at base. *Abdomen:* Ground-colour yellow, tergites 4 and 5 often mainly to partly infuscated. In posterior view tergites undusted. Macrochaetae reduced and weak: tergites 4 and 5 each with only weak lateral discal and marginal setae. *Measurements:* Length of body, 6·5–7·0 mm. Length of wing, 6·0–6·5 mm.

Material examined. NORTHERN TERRITORY: Burnside, attracted to and feeding in human excrement, 1 ♂, 28.iii.1929 (*T. G. Campbell*), CSIRO; Darwin, 1 ♀, 21.iv.1965 (*D. E. Havenstein*), CSIRO.

QUEENSLAND: Cairns, coll ex corn, 3 ♂, 7 ♀ (*J. F. Illingworth*), 2 ♂, 2 ♀ BMNH, 1 ♂, 5 ♀ Bishop; Cairns, coll ex cane, 1 ♂ (*J. F. Illingworth*), Bishop; Cairns, coll ex cage, 1 ♂ (*J. F. Illingworth*), Bishop; Cairns, coll ex window, 1 ♂ (*J. F. Illingworth*), Bishop; Bamboo Station, Coen, 1 ♂, 1 ♀, 2.v.1962 (*J. R. Byrne*), CSIRO; Townsville, 1 ♂ paratype, 1 ♀ (*G. F. Hill*), SPHTM; Cairns, 1 ♂ (*F. H. Taylor*), SPHTM; Big Mitchell

Creek, Mareeba-Molloy Road, 3 ♂, 1 ♀, 4.v.1967 (*D. H. Colless*), 1 ♂ BMNH, 2 ♂, 1 ♀ CSIRO; 7–14 miles W. of Herberton, via Watsonville, 6 ♂, 4 ♀, 1.v.1967 (*D. H. Colless*), 1 ♂, 1 ♀ BMNH, 5 ♂, 3 ♀ CSIRO; 2 ♂ (Wainwright Coll.), BMNH; Tolga, near Atherton, 1 ♀, 3.i.1959 (*D. K. McAlpine*), Aust. Mus.; Cairns, coll ex corn, 1 ♂ and 1 ♀ paratypes (*J. F. Illingworth*), USNM.

Distribution and biology: Australia: Northern Territory and Queensland. An uncommon species.

This is a lowland species that has been found in tall rain forest, in dry savannah country near watercourses, and in scrub near the seashore. It has been collected on human faeces, and amongst corn and cane. It has also been found indoors.

Life-history and immature stages unknown.

Variation: The species shows some variation in colour, which may be due to differences in age among the specimens examined: the palpi and basal tarsal segments vary from brown to yellowish. In some females the anterior few prosternal setulae may be brown: such females can be distinguished from *vicaria* and *australis* by the presence of a median spot of white dust on the mesonotum at neck. The hairs on hypopleuron below metathoracic spiracle are absent in some females. The anterior *ia* seta is sometimes vestigial, or more rarely, totally absent. In the male the *pv* setae on mid femur may be well developed or so atrophied as to be scarcely distinguishable from the ground-setulae.

Affinities: *D. flavohirta* is very similar to *reversa* and *fulvohirta*, but males can be easily separated by the conspicuously enlarged upper inner eye-facets and the linear frons. The female is very difficult to separate from *reversa*, and isolated females of this complex can only be named occasionally by direct comparison with named specimens. The series of females associated with males that I have studied has enabled me to establish the identity of Walker's species and to find small differences between females of the two species.

### ***Dichaetomyia reversa*** (Walker)

(Text-figs. 15, 18, 21, 80, 83, 86)

*Sciomyza reversa* Walker, 1849 : 1069. Holotype ♀, NEW HOLLAND. In the British Museum (Natural History), London. [Examined.]

*Dichaetomyia luteohirta* Malloch, 1925 : 326. Holotype ♂, QUEENSLAND: Townsville. In the School of Public Health and Tropical Medicine, Sydney. [Examined.] **syn. n.**

*Dichaetomyia luteohirta* Malloch; Lee, Crust & Sabrosky, 1956 : 346.

*Dichaetomyia reversa* (Walker) Steyskal, 1965 : 445.

*Note on* reversa: Walker described this species from one female from New Holland, presented by J. Hunter. This female, in the BMNH, is the holotype and was studied by Steyskal (l.c.). It is in fair condition, with a few filaments of mould; the fore legs, mid legs, and right hand tarsi are missing. It has the usual Waterhouse label " Scyomyza [*sic*] reversa Walk. / One of Walker's series so named ". But the data, on a comparatively recent label in Barnett's hand, are " New Holland / J. Bynoe, R.N. / B.M. 1844–4 ". This confusion may be between the collector, Bynoe, and the donor, Hunter. The BMNH register for 1844–4 records Diptera from New Holland, north and north-west coasts, presented by the Haslar Hospital, collected by Bynoe, the surgeon on H.M.S. " Beagle ". I have no doubt that this female is the holotype. The identity is difficult to establish, as females of this part of the *vicaria*-group are extremely similar, but I am satisfied that *reversa* is identical with the species hitherto known as *luteohirta*.

*Note on* luteohirta: Malloch described this species from the " type, male, one male paratype, and allotype " from " Townsville, Queensland (*H. Priestly*) ". I have studied these three specimens that are located, as stated by Lee, Crust & Sabrosky (l.c.), in the SPHTM (holotype and allotype) and the USNM (paratype). The holotype was collected by F. H. Taylor, not H. Priestly as stated by Malloch, and on the allotype and paratype labels the collector's name is printed " Priestley ", and not " Priestly " as stated by Malloch.

Diagnosis: *D. reversa* can be distinguished from the other Australian species of the *vicaria*-group with entirely yellow pteropleural and prosternal setulae in the male sex by the complete but seam-like interfrontalia and the absence of *pv* setae on hind femur (Text-fig. 15), and in the female sex by the weaker and less numerous *av* setae on hind femur (Text-fig. 21).

♂. *Head:* Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite strong, but not as long as anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row. Parafrontalia, parafacialia and face silvery white pruinose; genae brown in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to twice diameter of anterior ocellus. 1 pair of inclinate *ori* above lunula, a weaker pair above, and 3–5 fine pairs, all on lower half of frons; in 1 ♂ (Yeppoon) connected by a few fine hair-like setulae to the pair of equally hair-like reclinate *ors* just before ocellar tubercle; sometimes a single auxiliary *ors* present. Antennae and basal half of arista yellow; 3rd segment white pruinose. 3rd segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which slightly exceeds length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to a little over diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to slightly less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with only 1–2 short hairs above the usual cluster of setulae at vibrissal angle. Mentum of proboscis dark brown. Palpi dull yellow to brown; compressed, slender, weakly clavate toward tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum whitish dusted, more densely so before suture, with a pair of slender undusted paramedian vittae before suture mesad of the *dc*, continued a short distance behind suture, a pair of undusted *prst* patches between *ph* and *dc*, and a pair of weakly dusted *post* vittae between *ia* and *dc*. Scutellum whitish dusted, more densely so in basal lateral corners, thinly so in apical half. Pleura virtually undusted. Spiracles pale yellow. Mesonotum with the ground-setulae rather fine and erect, dense between the *dc*; black unless otherwise stated; pleural ground-setulae pale unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair strong, much closer to each other than to the *dc*. All *dc* setae strong. 2 *h*, the outer one not much longer than the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*, the anterior one fine, sometimes vestigial or even absent. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae. Post-alar declivity with a few scattered pale hairs. Supra-squamal ridge bare. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with a well-developed black auxiliary seta below; the former surrounded by few, the latter by numerous, setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with a few setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one weaker than anterior one and much closer to posterior one than to anterior one. Metathoracic spiracle moderate, subtriangular, with a few black setulae on lower margin. Squamopleuron with a number of fine pale hairs. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather fine setulae, a few stronger ones apically. *Legs:* Yellow; fore and mid tarsal segments 3–5 brown, hind tarsal segments 4–5 brown, but tarsal colour rather variable and often all tarsi brownish. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur with 1 *a* and 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with the *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 strong *ad* and 1 weaker *av* seta; some of the *pd* ground-setulae more erect in apical half; *d* preapical a little longer than tibial diameter, shorter than the *ad*. *Wings:* Weakly yellowish tinged, especially at base; the veins pale. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, with a few inconspicuous hairs below. Small cross-vein placed apicad of the point where vein 1 enters costa. Hind cross-vein oblique, strongly sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base extending almost halfway to small cross-vein. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae and margins pale yellow, fringes pale. Knob of halteres yellow. *Abdomen:* Ground-colour yellow, tergites 4 and 5 with some brown discolouration. Sternites 1–3 yellow, 4–5 brownish. In posterior view, tergites greyish white dusted, often with an inconspicuous narrow median vitta and the hind-margins undusted. Macrochaetae weaker and more decumbent than in *fulvohirta*: tergite 3 with some lateral marginals, tergite 4 with several lateral discals and a marginal row, tergite 5 with 2 discal and 1 marginal rows. *Genitalia:* Text-figs. 80, 83, 86. *Measurements:* Length of body, 6·5–7·5 mm. Length of wing, 6·0–7·0 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, slightly longer than anterior *prst dc* seta, directed forwards and slightly outwards. The incurved *vti* a little longer than the outcurved *vte; pvt* outcurved, two thirds length of *vte*. Parafrontalia silvery-white pruinose on lower half, otherwise grey pruinose, subshining black alongside ocellar tubercle. Interfrontalia black in ground-colour; viewed from below, grey pruinose with the frontal triangle tinged with brownish; frontal triangle otherwise visible as an ill-defined black streak extending half to two-thirds distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle equal to almost twice diameter of anterior ocellus, at lunula broader than width of 3rd antennal segment. Interfrontalia with the margins convex, broadest at middle of frons, at lunula slightly broader than a parafrontale, bare. 3–4 pairs of inclinate *ori* on lower three-fifths of frons, only the lowest pair really strong, with few interstitials; 2 pairs of reclinate *ors*, the lower pair half or less length of upper pair, upper pair closer to lower than to *vti*; parafrontalia otherwise with short proclinate setulae on most of length. 3rd antennal segment infuscated beyond arista. *Thorax:* Viewed from above and behind, mesonotum and scutellum undusted except for a small median patch of white dust at neck. 1 ♀ (Yeppoon) with 2 pairs of *prsc acr* setae. Notopleuron with the setulae fewer in number, often all dark. Vallar ridge sometimes bare. Hypopleuron sometimes bare below spiracle. Squamopleural hairs sometimes dark. Scutellum with 0–3 setulae below the level of the strong setae. *Legs:* Mid femur without denser erect *av* and *pv* ground-setulae in basal half, without *v* setae except for 2–3 short *pv* setae. Hind femur without *pv* setae. *Wings:* Vein 3 sometimes with a setula above on the node at base. *Abdomen:* In posterior view, tergites undusted, the dark areas with a matt appearance. Macrochaetae reduced and weak: tergites 4 and 5 with only weak lateral discal and marginal setae. *Measurements:* Length of body, 6·5–7·5 mm. Length of wing, 6·0–7·0 mm.

Material examined. Holotype ♀ of *reversa*. AUSTRALIA: north or north-west coast (*J. Bynoe*), BMNH.

Holotype ♂ of *luteohirta*. Queensland: Townsville (*F. H. Taylor*), SPHTM.

Torres Strait: Thursday Island, 7 ♂, 5 ♀, 12.ii.1962 (*D. B. Copeman*), 1 ♂, 1 ♀ BMNH, 6 ♂, 4 ♀ CSIRO.

Queensland: Townsville, ♀ allotype of *luteohirta*, 24.ii.1913 (*H. Priestley*), SPHTM; Townsville, ♂ paratype of *luteohirta* (*H. Priestley*), USNM; Townsville, 1 ♂, ii.1929 (*Taylor*), SPHTM; Townsville, 1 ♂ (*G. F. Hill*), SPHTM; Cairns, 1 ♂ (*F. H. Taylor*), SPHTM; Cairns, 1 ♂, 1.v.1955 (*K. R. Norris & I. F. B. Common*), BMNH; Palm Island, 1 ♂, 1 ♀, xii.1931 (*Mackerras*), CSIRO; Yeppoon, 1 ♂, 1 ♀, 10.v.1955 (*K. R. Norris*), ♂ CSIRO, ♀ BMNH; Carpentaria Downs Station, attracted to meat, 2 ♀, 8.v.1963, Qld. Dept. Pr. Ind.; 40 miles north of Cairns, 1 ♀, 6.iv.1965 (*D. E. Havenstein*), CSIRO.

Distribution and biology: Australia: Torres Strait (Thursday Island) and Queensland. An uncommon species.

This species has been collected in open country and has been attracted to meat. Life-history and immature stages unknown.

Variation: The male from Yeppoon has a few hair-like setulae connecting the *ori* and *ors*, but this space is bare in all other males, and the female from this locality has 2 pairs of *prsc acr* setae. One male from Thursday Is. lacks the anterior *ia* on both sides, and several other specimens from this locality have this seta weak and only slightly differentiated from the adjacent ground-setulae. Some females, as in other species, lack the pale hairs on hypopleuron below spiracle. The colour of the basal tarsal segments varies from brown to yellow, but this may be due to differences in age of the specimens examined. Some of the specimens from Thursday Is. have darker hairs or setulae on certain parts, for example on notopleuron and squamopleuron, but this may be due to grease.

Affinities: *D. reversa* is most closely related to the Australian *fulvohirta* and *flavohirta*, from which it is scarcely distinguishable in the female sex (see above, p. 251). The male differs from *fulvohirta* by the weaker femoral setae. It differs from *vicaria*, which it otherwise resembles, by the entirely yellow pteropleural setulae and in addition by the distinct interfrontalia in the male and the spot of white dust on the mesonotum at neck in the female.

## Females of *Dichaetomyia flavohirta* Malloch and *reversa* (Walker)

As discussed above, females of these two species cannot always be separated. The following females have been studied and are tentatively identified:

### *D. ? flavohirta* Malloch

Torres Strait: Badu Island, 2 ♀, 3.ii.1962 (*D. W. Lavers*), BMNH and CSIRO.

Northern Territory: East Point, Darwin, 1 ♀, 12.vi.1964 (*K. R. Norris*), CSIRO; Darwin, 1 ♀, 18.ix.1921 (*W. K. Hunt*), S.A. Mus.

### *D. ? reversa* (Walker)

QUEENSLAND: 12 miles S.E. of Bowen, 1 ♀, 6.v.1955 (*K. R. Norris*), CSIRO; Tolga, 1 ♀, 23.viii.1951 (*A. H. Wetherly*), CSIRO; Townsville, 2 ♀ (*F. P. Dodd*), BMNH.

## ***Dichaetomyia fulvohirta* sp. n.**

(Text-figs. 16, 19, 81, 84, 87)

Diagnosis: *D. fulvohirta* can be distinguished from the other Australian species of the *vicaria*-group with entirely yellow pteropleural and prosternal setulae by the long *av* and *pv* setae on hind femur (Text-figs. 16 and 19); the long *pv* setae on mid femur and the complete but seam-like interfrontalia are useful supporting characters. The female is not known at present.

♂. *Head:* Eyes virtually bare, with only the usual microscopic pubescence. Ocellar setae quite strong, but not as long as anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row. Parafrontalia, parafacialia and face silvery white pruinose; genae reddish in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to twice diameter of anterior ocellus. 6 pairs of inclinate *ori* on lower half of frons, only the lowest pair really strong, the upper ones more hair-like; 1 pair of hair-like reclinate *ors* just before ocellar tubercle. Antennae and basal half of arista yellow; 3rd segment white pruinose. 3rd segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which equals length of 3rd antennal segment. Parafacialia and genae bare. In lateral view, vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to slightly less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with only 1–2 short hairs above the usual cluster of setulae at vibrissal angle. Mentum of proboscis dark brown. Palpi brownish; compressed, slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum whitish dusted, more densely so before suture, with a pair of slender undusted paramedian vittae before suture mesad of the *dc*, continued a short distance behind suture, a pair of undusted *prst* patches between *ph* and *dc*, and a pair of weakly dusted *post* vittae between *ia* and *dc*. Scutellum thinly dusted, more densely so in basal lateral corners, undusted in apical half. Pleura virtually undusted. Spiracles pale yellow. Mesonotum with the ground-setulae rather fine and erect, dense between the *dc*, black unless otherwise stated; pleural ground-setulae pale unless otherwise stated. *Acr* 0 + 2, the *prsc* pair strong, closer to each other than to the *dc*; preceded by a weaker but strong pair, but this character is so unusual in *Dichaetomyia* that it must be an aberrant feature. All *dc* setae strong. 2 *h*, the outer one not much longer than the inner one, with a weak 3rd (inner) seta. 2 *ph*, the posterior one one and a half times length of the anterior one. 2 *ia*, the anterior one fine. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae. Post-alar declivity with a few scattered pale hairs. Suprasquamal ridge bare. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with a well-developed black auxiliary seta below; the former surrounded by few, the latter by numerous, setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with several setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one weaker than anterior one and much closer to posterior one than to anterior one. Metathoracic spiracle moderate, subtriangular, with a few black setulae on lower margin. Squamopleuron with a number of fine pale hairs. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather fine setulae, a few stronger ones apically. *Legs:* Yellow, tarsal segments 3–5 brown. Tarsi unremarkable. Fore femur without *av* setae, with a complete row of *pv* setae. Mid femur with the *av* ground-setulae more dense and erect in basal third; 1 *a* and 3–4 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with the *ad* row complete; 1–2 *d* and 1 *pd* preapical setae. Hind tibia with 1 strong *ad* seta and 1–2 weaker *av* setae; some of the *pd* ground-setulae more erect in apical half; *d* preapical a little longer than tibial diameter, shorter than the *ad*. *Wings:* Rather yellowish at base, otherwise clear; the veins brownish. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, with a few pale hairs below. Small cross-vein placed below the point where vein 1 enters costa. Hind cross-vein oblique, strongly sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base and just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae and margins pale yellow, fringes pale. Knob of halteres yellow. *Abdomen:* Rather shrivelled and discoloured by post-mortem decay. Tergites 1 + 2 and 3 brownish yellow, tergites 4 and 5 brown, sternites obscured; when cleared, ground-colour of tergites and sternites yellow, tergite 4 with a pair of small indistinct brown spots on hind margin, tergite 5 broadly brown on over median third of disc from fore- to hind-margin. In posterior view, tergites with some whitish dust. Macrochaetae quite strong and erect: tergite 3 with some lateral marginals, tergite 4 with several lateral discals and a marginal row, tergite 5 with 2 discal and 1 marginal row. *Genitalia:* Text-figs. 81, 84, 87. *Measurements:* Length of body, 6·0 mm. Length of wing, 5·5 mm.

Holotype ♂. QUEENSLAND: Cannonvale, near Prosperpine, 24.vi.1958 (*T. G. Campbell*), CSIRO.

Distribution and biology: Australian: known only from the holotype, from Queensland, which was collected in or near rain forest. Life-history and immature stages unknown.

Variation: The presence of 2 pairs of *prsc acr* setae is clearly aberrant, and only a single pair (the present posterior pair) should be expected in further specimens.

Affinities: *D. fulvohirta* is most closely related to *reversa* and *flavohirta*. From *flavohirta* it may be distinguished by the absence of conspicuously enlarged eye-facets, broader frons, and stronger *pv* setae on mid femur. From *reversa* it may be distinguished by the stronger and more numerous ventral setae on hind femur (cf. Text-figs. 15–16 and 18–19). It resembles *australis* in general habitus, but differs by the broader frons, richer hind femoral setation (cf. Text-figs. 8, 10, 16 and 19), and entirely yellow pteropleural setulae.

## THE *POLITA*-GROUP

This group includes nine described Oriental and Australasian species in which there are 3 *post dc* setae, fore tibia with a submedian *p* seta, squamopleuron bare, and scutellum with 6–10 setulae descending in 1–2 irregular rows just below the level of the strong setae, otherwise bare laterally and ventrally.

The *polita*-group possesses the following additional characters:

Mentum of proboscis dusted. Male with 2 pairs of reclinate *ors*. Female with only one pair of strong inclinate *ori* at lunula, with a second weak pair above them; parafrontalia comparatively broad (Text-fig. 22). 2 *prst dc* setae, the anterior pair at most half as long as the posterior pair, sometimes absent. *Prst acr* setulae 9- to 10-serial. *Pra* seta well-developed but short, about half length of 2nd *npl*. Vallar ridge bare. Hypopleuron bare on beret and below spiracle, with some hairs on metepisternum. Stem-vein bare above, rarely individually with a few fine hairs at base. Lower squama bare on disc.

Six Malayan and Philippine species belong to this group: *atratula* Malloch, *fulvitarsis* Malloch, *fusciventris* Emden, *indica* (Walker), *nigrita* Malloch and *nigriventris* Malloch. The New Guinea *polita* (Stein) and *nigrolineata* (Stein) also belong here. I have seen further undescribed Melanesian species and subspecies related to *polita*. *D. collessi* sp. n. differs from all these species by the entirely yellow colour of thorax and legs.

## *Dichaetomyia collessi* sp. n.

(Text-figs. 22, 70, 73, 76)

Diagnosis: *D. collessi* can be distinguished from all other Australian species with bare scutellar margins and 3 *post dc* setae by the bare squamopleuron and the presence of a *p* seta on fore tibia.

♂. *Head:* Frons slender, at narrowest point eyes separated by diameter of anterior ocellus or slightly more. Eyes virtually bare, with only the usual microscopic pubescence; upper inner facets enlarged as usual but not conspicuously so. Ocellar setae fine, not as long as anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row which are entirely black. Parafrontalia and parafacialia silvery white pruinose, the former grey on upper third; face thinly white pruinose; genae black in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to just over diameter of anterior ocellus. Interfrontalia extremely slender, two small triangles visible before ocellar tubercle and at lunula, present as a line on median third of frons. 3 pairs of quite strong inclinate *ori* with a fine hair-like pair above them, sometimes with a few hair-like interstitials, all on lower half of frons; *ori* sometimes connected to *ors* by a few fine setulae. First two antennal segments and base of 3rd segment yellow, 3rd segment whitish pruinose; arista dull yellow on basal third. 3rd segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which almost equals length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to under diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia largely invisible; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to slightly less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending to midway level of 3rd antennal segment. Mentum of proboscis dark brown. Palpi compressed, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum rather densely whitish dusted before suture, with a pair of slender undusted paramedian vittae, mesad of the *dc*, and a pair of undusted triangular marks between *dc* and *ph*; indistinctly and thinly dusted behind suture, in extreme posterior view usually with undusted vittae between *dc* and *ia* and between *ia* and *sa*, and with a broad undusted *prsc* fascia. Pleura undusted. Spiracles pale yellow to yellow. Mesonotum with the ground-setulae rather sparse and fine, except between the *dc*; all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair quite strong, placed behind the transverse level of *prsc dc* and placed closer to each other than to the *dc*. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*, the anterior one often weak, two to three times as long as a ground-setula. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity with a few scattered pale and dark hairs. Supra-squamal ridge bare, sometimes with a few fine pale or dark hairs. Prosternum black setulose, sometimes some setulae appearing pale. Propleural depression bare. 1 propleural and 1 prostigmatal seta, the latter with a well-developed auxiliary seta below; the former surrounded by few, the latter by numerous, dark setulae. 1st *npl* longer and stronger than 2nd;

disc of notopleuron with several dark setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner; ground-setulae black. Infra-alar bulla yellow, bare. Pteropleuron with the setulae all black, those on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one weaker than anterior one and slightly closer to posterior one than to anterior one. Hypopleuron with the hairs on metepisternum dark. Metathoracic spiracle quite large, subtriangular, with a row of quite long dense setulae along lower and posterior margins. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically. *Legs:* Yellow, apical tarsal segments darker; 1 ♂ (Bamaga) with femora darkened in basal half or more. Tarsi unremarkable. Fore femur with a complete row of *pv* setae. Mid femur without *av* setae, on *pv* surface with a row of setae in basal half that equal femoral depth that merge into the ground-setulae in apical half, but sometimes only poorly developed; 1 *a* and 3(–4) *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with a complete row of *av* setae, those in basal half rather fine and sometimes poorly developed, the preapical 3 strong; on *pv* surface with a row of short fine erect setae in basal half. about half femoral depth, these sometimes reduced and only 1–2 short setulae evident; *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 *ad* and 2 (3 on one side in holotype) *av* setae; some of the *pd* ground-setulae more erect in apical half, with a stronger one level with the *ad*; *d* preapical subequal to tibial depth, shorter than the *ad*. *Wings:* Rather yellow costally and basally, otherwise usually faintly but conspicuously smoky. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, in basal half below with a number of quite long fine dark hairs. Small cross-vein placed basad of or below the point where vein 1 enters costa. Hind cross-vein oblique. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base and just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae deep yellow, margins and fringes paler. Knob of halteres weakly infuscated. *Abdomen:* Tergite 1 + 2 yellow; tergite 3 yellow with a dark hind-marginal fascia, usually occupying posterior three-quarters of tergite, rarely narrow; tergite 4 dark except for anterior lateral angles or a slender fore-marginal fascia, sometimes wholly dark; tergite 5 dark with a yellow hind-margin. Sternites yellow, sternite 5 darkened towards lobes or entirely dark. In posterior view, tergites thinly grey to brownish grey dusted, without an undusted median vitta. Macrochaetae quite well-developed: tergites 4 and 5 each with a marginal row, and tergite 5 also with a discal row interrupted at middle. Sternite 1 dark setulose. *Genitalia:* Text-figs. 70, 73, 76. *Measurements:* Length of body, 6·5–7·0 mm. Length of wing, 6·0–6·5 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, slightly shorter than 2nd *prst dc* seta, directed forwards and slightly outwards. *Vti* strong, incurved, longer than the outcurved *vte*; *vte* twice as long as post-ocular setulae; *pvt* weak, outcurved. Parafrontalia silvery white pruinose on lower quarter only, otherwise dull grey pruinose, subshining black alongside ocellar tubercle. Interfrontalia black in ground-colour, sometimes dull red towards lunula; viewed from below, brownish grey pruinose; frontal triangle visible as an ill-defined black streak extending two-thirds to three-quarters distance from anterior ocellus to lunula. Parafrontalia broadening gradually towards lunula; at lunula a parafrontale broader than width of 3rd antennal segment. Interfrontalia with the margins broadly convex, weakly indented around middle, at lunula slightly broader than a parafrontale, bare. 2 pairs of reclinate *ors*, the upper pair strongest and placed closer to lower pair than to *vti*; parafrontalia otherwise with short proclinate setulae from upper *ors* to lunula. Parafacialia slightly broader, opposite insertion of arista just over diameter of anterior ocellus. *Thorax:* Scutellum undusted. *Legs:* Mid femur with the *pv* setae usually absent. Hind femur with the *av* and *pv* setae in basal half weaker, sometimes absent. *Wings:* Knob of halteres yellow or dark. *Abdomen:* Ground-colour varying as in male, sometimes almost entirely yellow; generally lighter than in male. In posterior view, without conspicuous dust, appearing subshining. Macrochaetae fewer in number and weaker. *Measurements:* Length of body, 6·5–7·0 mm. Length of wing, 6·0–6·5 mm.

Holotype ♂. QUEENSLAND: Mossman Gorge, 24.iv.1967 (*D. H. Colless*), CSIRO.

Paratypes, 9 ♂, 9 ♀. QUEENSLAND: Mossman Gorge, 1 ♀, 21.iv.1967, 1 ♂, 23.iv.1967, and 1 ♀, 24.iv.1967 (*D. H. Colless*), 1 ♂, 1 ♀ BMNH, 1 ♀ CSIRO; Bamaga, Cape York, 1 ♂, 26.iii.1964, and 1 ♂, 4.iv.1964 (*I. F. B. Common & M. S. Upton*), CSIRO; 4 miles E. of El Arish, 1 ♂, 1.v.1958 (*T. G. Campbell*), CSIRO; Mt. Bartle Frere, East base, 80 ft., 1 ♂, 25.iv.1955 (*K. R. Norris & I. F. B. Common*), CSIRO; Bamboo Creek, near Miallo, N. of Mossman, 2 ♂, 1 ♀, 25.iv.1967 (*D. H. Colless*), 1 ♂ BMNH, 1 ♂, 1 ♀ CSIRO; Innisfail, 1 ♂ (*F. H. Taylor*), SPHTM; Crystal Cascades, Cairns, 2 ♀, 19.iv.1967 (*D. H. Colless*), CSIRO; The Boulders, Babinda, 1 ♀, 10.v.1967 (*D. H. Colless*), CSIRO; Kuranda, 1 ♀, 17.v.1958 (*D. K. McAlpine*), Aust. Mus.; Claudie River near Mt. Lamond, 2 ♀, 1 and 5.vi.1966 (*D. K. McAlpine*), Aust. Mus.; Mt. Spec, 1 ♂, 1.iv.1965 (*D. E. Havenstein*), CSIRO.

Distribution and biology: Australia: Queensland. An uncommon species.

This species has been found exclusively in lowland rain forest, occurring up to 300 m. Life-history and immature stages unknown.

Variation: This species is rather constant in structure and colour, but there is some variation in mid and hind femoral chaetotaxy that makes it difficult to use these characters in separating *collessi* from *aseta*. In the male, the mid femur has the *pv* setae well developed in seven out of nine specimens; the hind femur has the *av* row poorly developed in basal half in two out of nine specimens, and the *pv* setae limited to only 1–3 weak setae in three out of nine specimens. In the female sex, the mid femur has the *pv* setae well developed in only two out of nine specimens; the hind femur has the *av* row poorly developed in basal half in five out of nine specimens, and the *pv* setae limited to only 1–3 weak setae in five out of nine specimens and none at all in one out of nine. In the female the dusted *acr* vitta is sometimes confined to the neck.

Affinities: *D. collessi* occupies a rather isolated position amongst Australian *Dichaetomyia*. It is most closely related to the New Guinea *polita* (Stein) and, more distantly, to the Malayan and Philippine species of the *polita*-group. From all of these it can be distinguished by its entirely yellow thorax and legs.

Discussion: One of the specimens named as *apicalis* (Stein) by Malloch, but not recorded by Malloch, belongs to this species.

## THE *DEMENS*-GROUP

This small group includes five described species, all of which are confined to the Australasian region, in which there are 3 *post dc* setae, fore tibia without a submedian *p* seta, squamopleuron bare, and scutellum with only a few (2–5) setulae at or just below the level of the strong setae, otherwise bare laterally and ventrally.

The *demens*-group possesses the following additional characters:

Mentum of proboscis dusted. Male with 1 pair of reclinate *ors*. Female parafrontalia normal, narrow (Text-fig. 23). 2 *post dc* setae, the anterior pair at most half as long as the posterior pair. *Prst acr* setulae 8- to 10-serial. *Pra* seta well-developed but short, about half length of 2nd *npl*. Vallar ridge bare. Hypopleuron bare on beret and below spiracle, with some hairs on metepisternum. Stem-vein bare above, rarely individually with a few fine hairs at base. Lower squama bare on disc.

Three of the non-Australian species of this group, *bifasciata* (Stein) from New Guinea, *leucoceros* (Walker) from Misoöl Island, and *demens* (Stein) from Waigeo Island, differ from *aseta* by the extensively or partially infuscated mesonotum and pleura. The fourth species, *carolina* Snyder from the Eastern Caroline Islands, differs from *aseta* by the entirely fulvous abdomen, without dark bands.

### ***Dichaetomyia aseta* sp. n.**

(Text-figs. 23, 88, 91, 94)

Diagnosis: *D. aseta* can be distinguished from all other Australian species with bare scutellar margins and 3 *post dc* setae by the bare squamopleuron and the absence of a *p* seta on fore tibia.

♂. *Head:* Frons slender, at narrowest point eyes separated by diameter of anterior ocellus. Eyes virtually bare, with only the usual microscopic pubescence; upper inner facets enlarged as usual but not conspicuously so. Ocellar setae fine, subequal to anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row which are entirely black. Parafrontalia and parafacialia silvery white pruinose, the former greyer towards vertex; face thinly white pruinose; genae black in ground-colour, grey to brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to just over diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula, present as a line or almost obsolete on median third of frons. 2 pairs of moderate inclinate *ori*, with 0–1 pairs of interstitials and a fine hair-like pair above them, all on lower third of frons. First 2 antennal segments and basal third of arista yellow; 3rd segment white pruinose. 3rd segment two and a half to three times as long as broad, in frontal view falling short of epistoma by almost half its own width. Arista with long regular plumosity, the longest of which exceeds length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia largely invisible; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending only a short distance above level of tip of 3rd antennal segment. Mentum of proboscis brown. Palpi compressed, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum thinly whitish dusted: before suture with a pair of undusted or thinly dusted paramedian vittae, mesad of *dc*, and a pair of undusted patches between *dc* and *ph*; more thinly dusted behind suture, with undusted vittae between *dc* and *ia* and between *ia* and *sa*, virtually undusted medially between the *dc*, and with an undusted *prsc* fascia. Pleura undusted. Spiracles pale yellow. Mesonotum with the ground-setulae sparse and fine, except between the *dc*; all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair quite strong, placed behind the transverse level of *prsc dc*, equidistant from *dc* or closer to each other than to the *dc*. 2 *h*, the anterior one one and a half times length of the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*, the anterior one weak. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity with a few scattered pale and dark hairs. Supra-squamal ridge bare. Prosternum densely brown setulose, several of the setulae appearing golden, sometimes pale setulose. Propleural depression bare. 1 propleural and 1 prostigmatal seta, the latter with a well-developed auxiliary seta below; the former surrounded by few, the latter by numerous, mainly dark setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with several dark setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous setula in upper anterior corner; ground-setulae entirely dark. Infra-alar bulla yellow, bare. Pteropleuron with the setulae all dark, those on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. *Stpl* 1 + 2, the lower one subequal to or slightly weaker than anterior one and much closer to posterior one than to anterior one. Hypopleuron with brown hairs on metepisternum. Metathoracic spiracle quite large, subtriangular, with a row of quite long dense setulae along lower and posterior margins. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically and laterally. *Legs:* Yellow, apical tarsal segments brown. Tarsi unremarkable. Fore femur with a complete row of *pv* setae. Mid femur without *av* setae, on *pv* surface with a row of setae in basal half that equal femoral depth and that merge into the ground-setulae in apical half, sometimes reduced to 1–2 setae; 1 *a* and 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with a complete row of *av* setae, those in basal half rather fine, the preapical 3 strong; without or with a few short *pv* setae, in basal quarter; *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 *ad* and 2 *av* setae; some of the *pd* ground-setulae more erect in apical half, with a stronger one near level of the *ad*; *d* preapical subequal to tibial depth, slightly shorter than the *ad*. *Wings:* Rather yellow costally and basally, otherwise faintly but conspicuously smoky. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, in basal half below with a few short brown hairs. Small cross-vein placed below the point where vein 1 enters costa. Hind cross-vein oblique. Vein 1 bare above. Vein 3 bare above; below with a few setulae on the node at base extending halfway to small cross-vein. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae deep yellow, sometimes brownish posteriorly, margins and fringes paler. Knob of halteres weakly infuscated. *Abdomen:* Tergite 1 + 2 yellow, sometimes with a darker hind-margin; tergite 3 yellow, slightly to broadly darkened on hind-margin, browner laterally; tergite 4 with a broad dark fascia, browner laterally, fore- and sometimes hind-margins yellow, or entirely brown. Sternites yellow, posterior ones often infuscated. In posterior view, tergites subshining. Macrochaetae quite well developed: tergite 4 with some lateral discals and a marginal row that is interrupted at middle, tergite 5 with some lateral discals and a marginal row. Sternite 1 brown setulose. *Genitalia:* Text-figs. 88, 91, 94. *Measurements:* Length of body, 6·5–7·0 mm. Length of wing, 6·0–6·5 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, slightly shorter than 2nd *prst dc* seta, directed forwards and slightly outwards. *Vti* strong, incurved, longer than the outcurved *vte; vte* twice as long as post-ocular setulae; *pvt* weak, outcurved. Parafrontalia silvery white pruinose on lower third to half, otherwise dull grey pruinose, shining black alongside ocellar tubercle. Interfrontalia black in ground-colour; viewed from below, brownish grey pruinose; frontal triangle visible as a subshining black streak extending three-quarters distance from anterior ocellus to lunula. Parafrontalia broadening towards lunula; at lunula a parafrontale broader than width of 3rd antennal segment. Interfrontalia with the margins convex, broadest at middle of frons, at lunula broader than a parafrontale, bare. 2 pairs of moderate reclinate *ors*, the upper one strongest and placed closer to lower pair than to *vti*; parafrontalia otherwise with short proclinate setulae from upper *ors* to lunula. 3rd antennal segment infuscated beyond arista. Parafacialia broader, opposite insertion of arista just over diameter of anterior ocellus. Palpi darkened at base. *Thorax:* Scutellum undusted. *Legs:* Mid femur with the *pv* setae reduced, often only 1 seta. Hind femur with the *pv* setulae few and weak, as in male. *Wings:* Squamae and halteres sometimes rather lighter. *Abdomen:* Varying as in male; basic pattern as in male, but reduced and colour generally lighter. Macrochaetae reduced: tergite 5 with only a few lateral discals and a weak marginal row. *Measurements:* Length of body, 6·5–7·0 mm. Length of wing, 6·0–6·5 mm.

Holotype ♂. QUEENSLAND: Upper Mulgrave River, 10 m. Goldsborough Road, 9.v.1967 (*D. H. Colless*), CSIRO.

Paratypes, 19 ♂, 31 ♀. QUEENSLAND: Upper Mulgrave River, 8 miles Goldsborough Road, 1 ♂, 9.v.1967 (*D. H. Colless*), BMNH; Upper Mulgrave River, 10 miles

Goldsborough Road, 1 ♀, 9.v.1967 (*D. H. Colless*), CSIRO; 10 miles S. of Daintree, 1 ♂, 29.iv.1955 (*K. R. Norris*), CSIRO; The Boulders, Babinda, 4 ♂, 6 ♀, 10.v.1967 (*D. H. Colless*), 1 ♂, 2 ♀ BMNH, 3 ♂, 4 ♀ CSIRO; Mossman Gorge, 1 ♂, 2 ♀, 23.iv.1967 (*D. H. Colless*), 1 ♀ BMNH, 1 ♂, 1 ♀ CSIRO; Mossman Gorge, 1 ♂, 1 ♀, 24.iv.1967 (*D. H. Colless*), ♂ BMNH, ♀ CSIRO; Mt. Edith Forest Road, 1 mile off Danbulla Road, 1 ♂, 1 ♀, 6.v.1967 (*D. H. Colless*), CSIRO; Mt. Edith Forest Road, 1½ miles off Danbulla Road, 2 ♀, 6.v.1967 (*D. H. Colless*), BMNH & CSIRO; Wongabel State Forest, 1 ♂, 5.v.1967 and 1 ♂, 7.v.1967 (*D. H. Colless*), CSIRO; Kuranda Range State Forest, 7–8 miles Black Mtn Road, 1 ♂, 20.iv.1967 (*D. H. Colless*), CSIRO; Kuranda Range State Forest, 3 ♂, 2 ♀, 20.iv.1967 (*D. H. Colless*), 1 ♂ BMNH, 2 ♂, 2 ♀ CSIRO; Crystal Cascades, Cairns, 1 ♂, 1 ♀, 19.iv.1967 (*D. H. Colless*), CSIRO; Mount Spec, 1 ♀, 26.iv.1958 (*K. L. Harley*), CSIRO; 3 miles N. of Kuranda, 1 ♀, 24.iv.1955 (*K. R. Norris*), CSIRO; Mt. Bartle Frere, East base, 80 ft., 1 ♀, 25.iv.1955 (*K. R. Norris*), CSIRO; Mount Spec, 2,600 ft., 2 ♀, 4.iii.1964 (*I. F. B. Common & M. S. Upton*), CSIRO; 1 ♂, 1 ♀ (Brunetti Coll.), BMNH; 2 ♀, ix.1910 (Brunetti Coll.), BMNH; Kuranda, 2 ♀, 21.v.1958, 1 ♀, 19.v.1958, 1 ♀, 17.v.1958, and 1 ♂, 6.v.1958 (*D. K. McAlpine*), Aust. Mus.; Claudie River near Mt. Lamond, 1 ♀, 28.v.1966 (*D. K. McAlpine*), Aust. Mus.; Kuranda, 2 ♀, 11 and 13.iii.1956 (*J. L. Gressitt*), Bishop; Mount Spec, 1 ♂, 1.iv.1965 (*D. E. Havenstein*), CSIRO.

Distribution and biology: Australia: Queensland. An uncommon species.

This species has been found almost exclusively in rain forest, up to 850 m., and also in riverine scrub in savannah woodland.

Life-history and immature stages unknown.

Variation: This species is rather constant in structure and colour, but some slight variation has been observed. The prosternal setulae are basically dark, but may sometimes be partially pale or even, in a few females, entirely pale. The palpi are usually entirely pale, but may be darkened towards base. The median mesonotal vitta in the female varies in extent: it may be confined to neck, or may reach to suture. The stem-vein in some individuals bears tiny pale hairs at base on upper wing-surface. Leg chaetotaxy varies slightly in both sexes. In the male, the *pv* setae on mid femur vary from 1–2 to a short row in basal half; on hind femur the *av* row is complete though weak in basal half, and *pv* surface has none to a few short setulae in basal half. In the female, the mid femur has only 1–3 *pv* setae; hind femur has only 1–3 weak *pv* setae, and the *av* row complete or almost absent in basal half.

Affinities: *D. aseta* is very closely related to the other species of the *demens*-group, from which it can be distinguished by the entirely yellow ground-setulae of mesonotum and pleura, and dark-banded abdomen. It is most closely related to *carolina* Snyder which has an entirely clear yellow unmarked abdomen. Like *collessi* sp. n., *aseta* occupies an isolated position amongst Australian *Dichaetomyia*.

## THE *RUFESCENS*-GROUP

This group includes at least twelve Australasian and about forty-five Oriental species, in which the scutellum possesses no to several setulae descending just below the level of the strong setae, otherwise bare laterally and ventrally, 3 *post dc* setae, fore tibia without a submedian *p* seta, and squamopleuron haired.

The *rufescens*-group possesses the following additional characters:

Hypopleuron bare on beret, sometimes haired below spiracle, always haired on metepisternum. *Pra* seta well-developed but short, about half length of 2nd *npl* seta. Stem-vein bare or haired above. 2 *prst dc* setae, the anterior one usually strong. *Prst acr* setulae 7- to 10-serial. Vallar ridge haired or bare. Lower squama bare on disc. Mentum of proboscis dusted.

A very large number of Oriental species belongs to this group which is clearly rather heterogeneous as defined at present. Species described or recorded from the Australasian region differ from the four Australian species as follows:

*D. lombokensis* Hennig, from Lombok Island, is a much darker species: mesonotum black except on humeri, scutellum infumated, infra-alar bulla dark.

*D. incerta* (Stein), from New Guinea, has the mesonotum largely darkened and, in the female, hind femur with 3 preapical *av* setae, otherwise without *av* or *pv* setae.

*D. latitarsis* (Stein), from the Oriental region and New Guinea, is closest to *spinuligera* sp. n.: see the discussion under that species (p. 226).

*D. rota* Snyder, from the South Mariana Islands (Rota Is.), is known in the male sex only, and possesses a broad frons.

*D. nigroscuta* Bohart and Gressitt, from the South Mariana Islands (Guam Is.), has the legs entirely black, with only the knees yellow.

*D. sabroskyi* Snyder, from the West Carolina Islands (Palau Is.), has the scutellum black and the legs, including tibiae, entirely dark.

*D. apicalis* (Stein) and *D. rufescens* (Stein) are discussed below.

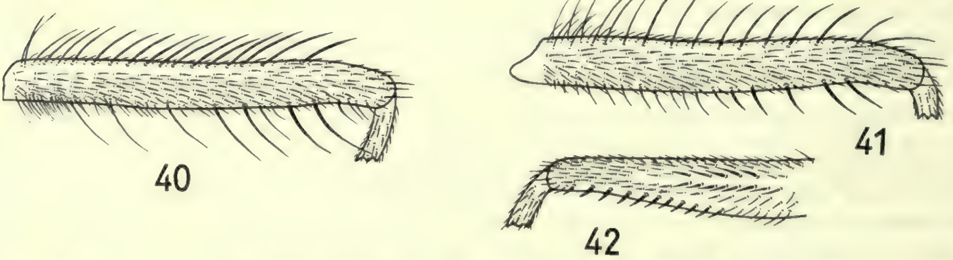
It is quite possible that *rufescens* will be found in Australia, for which reason a fuller discussion of its characters is given below, together with those of *apicalis*. Both species would be traced to couplet 21 in the key above (p. 209).

### *Dichaetomyia spinuligera* sp. n.

(Text-figs. 25, 27, 29, 39, 41, 42, 89, 92, 95)

Diagnosis: *D. spinuligera* can be distinguished from all other Australian *Dichaetomyia* by the presence of *av* spinules on fore and mid femora in the male, and by the dilated 3rd to 5th fore tarsal segments and by the conspicuous pale setulae among the pile on supra-spiracular convexity in the female.

♂. *Head:* Frons very slender, at narrowest point eyes separated by less than diameter of anterior ocellus. Eyes virtually bare, with only the usual microscopic pubescence; upper inner facets enlarged as usual but not conspicuously so. Ocellar setae fine, not as long as anterior *prst dc*. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row, which are black above but more golden below. Parafrontalia, parafacialia and face silvery white pruinose; genae black in ground-colour, grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to over diameter of anterior ocellus. Interfrontalia reduced, a small triangle visible at lunula and a longer one before ocellar tubercle, obsolete or visible as a faint seam on median half of frons. 3–4 pairs of weak inclinate *ori*, on less than lower third of frons; 1 pair of hair-like reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow; 3rd segment pale yellow, white pruinose. 3rd segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which almost equals length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter or less of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia largely invisible; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending to midway level of 3rd antennal segment. Mentum of proboscis light brown. Palpi compressed, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum with rather variable dust: either with very thin irregular white dust that is concentrated around suture and *prst dc* setae; or thinly white dusted with the usual undusted or thinly dusted markings: a pair of paramedian vittae mesad of the *dc*, a pair of *prst* patches between *ph* and *dc*, and a pair of *post* vittae between *ia* and *dc*. Scutellum undusted. Pleura virtually undusted. Anterior spiracle pale yellow. Mesonotum with the ground-setulae rather short and sparse, except between the *dc*; all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair well developed, placed behind the transverse level of *prsc dc* and closer to each other than to the *dc*; *prst* setulae irregularly 8-serial. 2 *h*, the inner one not much shorter than, to two-thirds the length of, the outer one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*, the anterior one fine or sometimes absent. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity with a few golden hairs. Supra-squamal ridge bare. Propleural depression bare. 1 propleural and 1 prostigmatal seta, the latter with a well-developed auxiliary seta below; the former surrounded by few, the latter by numerous, mainly golden setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with a few pale or pale and dark setulae around the bases of both setae. Mesopleuron with 4 strong setae in caudal row, and a conspicuous dark setula in upper anterior corner; ground-setulae mainly golden. Infra-alar bulla yellow, bare. Pteropleuron with the setulae mainly black, tips of lower ones pale; those on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. Vallar ridge bare. *Stpl* 1 + 2, the lower one subequal to anterior one and slightly closer to posterior one than to anterior one. Hypopleuron bare below spiracle; with some pale hairs on metepisternum. Metathoracic spiracle quite large, subtriangular, with a row of quite long setulae along lower and



FIGS. 38–42. ♂ femora of the *Dichaetomyia rufescens* group: 38, *D. fusconota* sp. n., hind femur, posterior view (♀, Kuranda, ix.10, paratype); 39, *D. spinuligera* sp. n., hind femur, posterior view (♀, Bamboo Ck, 25.iv.67, paratype); 40, *D. fusconota*, hind femur, anterior view; 41, *D. spinuligera*, hind femur, anterior view; 42, *D. spinuligera*, fore femur, anterior view.

posterior margins. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically. *Legs:* Yellow, apical tarsal segments darker. Tarsi unremarkable. Fore femur with a row of short stout *av* spinules in apical half (Text-fig. 42); with a complete row of *pv* setae. Mid femur with a row of short stout *av* spinules in apical third; with a row of fine *pv* setae in basal $\frac{3}{5}$, the longest of which equal or almost equal femoral depth, decreasing in length apicad; *a* surface with a row of short stout setae in basal half, strongest around middle; 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with a complete row of short *pv* setae, hair-like near base, stronger around middle, short and spinulose near apex (Text-fig. 39); *av* surface with a complete row of short setae, fine in basal half and spine-like in apical half (Text-fig. 41); *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 strong *ad* seta; some of the *pd* ground-setulae more erect in apical half, with a strong setula apicad of the *ad*; *d* preapical subequal to tibial depth, stronger than the *ad*. *Wings:* Rather yellow costally and basally, otherwise faintly but conspicuously smoky. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein with a few short hairs below. Small cross-vein placed basad of the point where vein 1 enters costa. Hind cross-vein oblique, sinuate. Vein 1 bare. Vein 3 bare above, rarely with a few setulae on the node at base; below with a few setulae on the node at base. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae and margins deep yellow, margins pale. Knob of halteres deep yellow. *Abdomen:* Tergite 1 + 2 yellow, with a dark hind-margin; tergites 3 and 4 entirely dark, paler laterally; tergite 5 dark, posterior half or more yellow. Sternites orange-yellow. In posterior view, tergites weakly and thinly brownish-grey dusted except for a median vitta and the hind-margins. Macrochaetae quite well-developed: tergites 3–5 with some lateral discals, tergites 3 and 4 with some lateral marginals, and tergite 5 with a marginal row. Sternite 1 dark setulose. *Genitalia:* Text-figs. 89, 92, 95. *Measurements:* Length of body, 6·5–7·5 mm. Length of wing, 6·0–7·0 mm.

♀. Differs from the male as follows: *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula (Text-fig. 27). Upper inner eye-facets not enlarged. Ocellar setae strong, longer than both *prst dc* setae, directed forwards and slightly outwards. *Vti* strong, directed upwards and slightly inwards, one and a half times length of the outcurved *vte*; *vte* twice as long as an adjacent post-ocular setula, slightly longer than the fine outcurved *pvt*. Parafrontal pruinosity tinged with yellow at upper two-thirds, above that yellowish grey. Interfrontalia red or black in ground-colour; viewed from below, greyish pruinose with the frontal triangle brownish grey; frontal triangle otherwise visible as a subshining black streak extending only half distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle a parafrontale equal to one and a half times diameter of anterior ocellus and quarter width of interfrontalia, at lunula less than width of 3rd antennal segment. Interfrontalia with the margins almost straight, diverging from vertex to lunula, at lunula broader than a parafrontale, bare (Text-fig. 27). 1 pair of strong inclinate *ori* at lunula, with 3–4 weaker pairs above that are directed forwards and inwards, all on lower half of frons; 2 pairs of strong reclinate *ors*, the upper pair slightly stronger and placed closer to lower pair than to *vti*; parafrontalia otherwise with short proclinate setulae on upper half. Parafacialia slightly broader, opposite insertion of arista equal to one and a half times diameter of anterior ocellus. In lateral view, parafrontalia but not parafacialia visible. Facial ridges without setulae above the cluster at vibrissal angle. *Thorax:* Viewed from above and behind, mesonotum virtually undusted, with white dusted markings as follows: a median vitta, and a pair of paramedian vittae through *dc*, from neck to 2nd *post dc*, tapering behind; a dot at suture on *ia* line; and weak indications of a lateral fascia along suture. Setae stronger than in male. *Prsc acr* on or behind the transverse level of *prsc dc*. Anterior *prst dc* half length of posterior one. Anterior *ia* strong. Notopleuron with dark setulae, around 2nd seta only. Pteropleural setulae golden below subalar ridge. Scutellum with 9–13 setulae in 1–2 irregular rows below the level of the strong setae. *Legs:* Yellow, tarsi black. Fore femur without *av* spinules. Mid femur without ventral setae, except for a curled *v* at base. Hind femur with a row of 3–5 strong *av* in apical $\frac{2}{5}$; on *pv* surface with a single seta at apical $\frac{2}{5}$, between this and apex with a few stronger setulae. Hind tibia with 2 *av* setae; the *pd* quite strong; *ad* preapical seta stronger than the *d*. *Wings:* Hind cross-vein more oblique and sinuate. Vein 3 with a few short setulae above on the node at base. *Abdomen:* Yellow; with some darker shadows on tergite 3, and a pair of large quadrate spots on tergite 4 separated on a mid-line (1 ♀); or with tergite 3 dark except for pale lateral anterior crescents, and tergite 4 almost entirely dark (1 ♀). Virtually undusted, even in posterior view. Macrochaetae as in Text-fig. 25. Sternite 1 pale setulose. *Measurements:* Length of body, 8·0 mm. Length of wing, 7·5 mm.

Holotype ♂. QUEENSLAND: 4 miles south of Atherton, 2.v.1955 (*Norris & Common*), CSIRO.

Paratypes, 4 ♂, 2 ♀. QUEENSLAND: Bamboo Creek, near Miallo, N. of Mossman, 2 ♂, 1 ♀, 25.iv.1967 (*D. H. Colless*), 1 ♂, BMNH, 1 ♂, 1 ♀ CSIRO; The Boulders, Babinda, 1 ♂, 10.v.1967 (*D. H. Colless*), CSIRO; Crystal Cascades, Cairns, 1 ♂ 19.iv.1967 (*D. H. Colless*), CSIRO; 1 ♀ (Brunetti Coll.), BMNH.

Distribution and biology: Australia: Queensland. A rare species. This species has been found exclusively in lowland rain forest. Life-history and immature stages unknown.

Variation: A very consistent species in colour and structure. The minor variations observed are noted in the description.

Affinities: *D. spinuligera* is very closely related to *latitarsis* (Stein), which has been recorded from New Guinea (Stein, 1919*b* : 207). These two species share such striking characters as the presence of an *ad* as well as an *a* preapical seta on mid femur, the arrangement of abdominal macrochaetae in the female (Text-fig. 25), the conspicuously forward-directed *ori* in the female (Text-fig. 27), and the dilated 3rd to 5th fore tarsal segments in the female (Text-fig. 29). *D. latitarsis* is a much darker species, with the ground-colour of the thorax very extensively dark; paler specimens are known, but these always have at least the triangular sclerite below infra-alar bulla dark. In *latitarsis* the vallar ridge is always haired anteriorly and the scutellum is dusted in basal lateral corners; the male lacks the *av* spinules on fore and mid femora, and the female has black hairs or setulae on squamopleuron, supra-spiracular convexity, and hypopleuron below spiracle.

## *Dichaetomyia fusconota* sp. n.

(Text-figs. 24, 26, 28, 38, 40, 90, 93, 96)

Diagnosis: *D. fusconota* can be distinguished from all other Australian *Dichaetomyia* by the mainly dark femora, pleura and mesonotum.

♂. *Head:* Frons slender, at narrowest point eyes separated by diameter of anterior ocellus. Eyes virtually bare, with only the usual microscopic pubescence; upper inner facets enlarged as usual but not conspicuously so. Ocellar setae fine, subequal to (holotype) or shorter than (paratype) anterior *prst dc*. Vertical setae short, only slightly longer than adjacent post-ocular-setulae. Post-ocular setulae very short, with several scattered setulae below the upper row which are entirely black. Parafrontalia, parafacialia and face silvery white pruinose; genae reddish brown in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to one and a half times diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula, visible as a seam or even partially obsolete on median third of frons. 3–4 pairs of inclinate *ori*, decreasing in size above, with a few hair-like interstitials, all on lower half of frons; with or without 1 pair of hair-like reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow; 3rd segment white pruinose. 3rd segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which equals length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia mainly visible, parafacialia visible though slender; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to slightly less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending to midway level of 3rd antennal segment. Mentum of proboscis brown. Palpi compressed, rather slender, weakly clavate towards tips. *Thorax:* Mesonotum brownish, yellow at sides, with a dark brown to black median vitta from neck to 2nd *post dc* and a pair of brown vittae outside *dc* from 2nd *prst* to 3rd *post dc*. Pleura partially infuscated, with black patches on mesopleuron, sternopleuron, hypopleuron and pteropleuron, and the triangular sclerite below infra-alar bulla black. Scutellum yellow; metanotum below scutellum dark brown. Viewed from above and behind, mesonotum whitish to yellowish grey dusted, with thinly dusted markings as follows: a pair of paramedian vittae mesad of the *dc*, narrow at neck, broader and becoming obsolescent after suture; a pair of *prst* patches between *ph* and *dc*; and 2 pairs of *post* vittae, between *ia* and *dc* and through the *sa*; a broad *prsc* fascia between *prsc* setae and scutellum completely undusted. Scutellum undusted, or inconspicuously dusted around the sub-basal lateral setae. Pleura grey dusted on the dark patches. Anterior spiracle yellow. Mesonotum with the ground-setulae rather fine and sparse, except between the *dc*; all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair well-developed, placed behind the transverse level of *prsc dc* and closer to each other than to the *dc*; *prst* setulae irregularly 8-serial. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one one and a half times length of the anterior one. 2 *ia*, the anterior one well developed. 2 *sa*, the posterior one weak. *Pra* well-developed but short, half length of 2nd *npl* (holotype), or hair-like (paratype). Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity with a few golden hairs. Supra-squamal ridge bare. Prosternum black setulose, some of the anterior setulae paler. Propleural depression bare. 1 propleural and 1 prostigmatal seta, the latter with 1–2 well-developed auxiliary setae below; the former surrounded by few, the latter by numerous, setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with dark setulae around base of posterior seta only. Mesopleuron with 4–5 strong setae in caudal row, and a conspicuous black setula in upper anterior corner. Infra-alar bulla yellow, bare. Pteropleuron with the setulae entirely black; those on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. Vallar ridge bare. *Stpl* 1 + 2, the lower one subequal to anterior one and much closer to posterior one than to anterior one. Metathoracic spiracle quite large, subtriangular, with a row of quite long setulae along lower and posterior margins. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, a few stronger ones apically; 5–7 setulae descending just below the level of the strong setae, otherwise bare laterally and ventrally. *Legs:* Coxae and trochanters yellow, coxae sometimes with dark shadows above; femora dark on all but apical ¼ to ⅕; tibiae yellow. Tarsi unremarkable. Fore femur with a complete row of *pv* setae. Mid femur with a row of *pv* setae in basal half, the longest equal to femoral depth, becoming shorter towards middle; without *av* setae; 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur on *av* surface with a few setae near base and a strong row in apical half (Text-fig. 40); on *pv* surface with a row of strong setae from base almost to apex (Text-fig. 38), decreasing in length apicad, the longest equal to femoral depth; *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 *ad* seta; some of the *pd* ground-setulae more erect in apical half; *ad* preapical slightly exceeding tibial depth, shorter than the *d*. *Wings:* Conspicuously yellowish-brown clouded. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein bare above, with a few dark hairs below. Small cross-vein placed basad of the point where vein 1 enters costa. Hind cross-vein oblique, sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base sometimes extending halfway to small cross-vein. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae and margins yellow to deep yellow, lower deeper than upper, fringes pale. Knob of halteres deep yellow. *Abdomen:* In posterior view, tergites appearing dull and with some inconspicuous whitish dust. Macrochaetae reduced: tergites 3 and 4 with some lateral marginals, tergite 5 with a marginal row, tergites 4 and 5 with some lateral discals. *Genitalia:* Text-figs. 90, 93, 96. *Measurements:* Length of body, 7·0–7·5 mm. Length of wing, 6·5–7·0 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula (Text-fig. 26). Upper inner eye-facets not enlarged. Ocellar setae strong, directed forwards and slightly outwards, slightly shorter than 2nd *prst dc* seta. *Vti* strong, directed upwards and slightly inwards, one and a half times length of the outcurved *vte*; *vte* three times as long as an adjacent post-ocular setula, longer than the outcurved *pvt*. Parafrontal pruinosity becoming grey to yellowish grey above. Interfrontalia black in ground-colour; viewed from below, grey pruinose with the frontal triangle sometimes more brownish; frontal triangle otherwise visible as a subshining black streak extending three-fifths distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle a parafrontale equal to twice diameter of anterior ocellus and one-fifth width of interfrontalia, at lunula broader than width of 3rd antennal segment. Interfrontalia with the margins convex, broadest at middle of frons, at lunula a little broader than a parafrontale, bare (Text-fig. 26). 1 pair of strong inclinate *ori* at lunula, with 3–5 weaker pairs above that are directed inwards, all on lower two-thirds of frons; 2 pairs of strong reclinate *ors*, the upper pair stronger and placed closer to lower pair than to *vti*; parafrontalia otherwise with a few short proclinate setulae on median half. 3rd antennal segment infuscated beyond arista. Parafacialia slightly broader, opposite insertion of arista equal to almost twice diameter of anterior ocellus. *Thorax:* Pleura slightly less extensively infuscated. Viewed from above and behind, mesonotum dusted as in male, but the undusted markings more conspicuous; the paramedian vittae mesad of the *dc* broad behind suture, twice as broad as they are before suture. Scutellum undusted. *Legs:* Fore femur yellow, mid and hind femora extensively but irregularly darkened. Femoral setae as in male, but slightly weaker. *Wings:* Squamae and fringes paler, lighter yellow. *Abdomen:* Colour as in male, chaetotaxy as in Text-fig. 24. *Measurements:* Length of body, 6·0 mm. Length of wing, 5·5 mm.

Holotype ♂. QUEENSLAND: 10 miles south of Daintree, 29.iv.1955 (*K. R. Norris*), CSIRO.

Paratypes, 1 ♂, 2 ♀. QUEENSLAND: Kuranda, 1 ♂, ix.1910 (*F. P. Dodd*), BMNH; Kuranda, 1 ♀, ix.1910 (Brunetti Coll.), BMNH; Kuranda, 1 ♀, 17.v.1958 (*D. K. McAlpine*), Aust. Mus.

Distribution and biology: Australia: Queensland. A rare species.

This species has been found in rain forest, up to 330 m., and in riverine scrub in savannah woodland. Life-history and immature stages unknown.

Variation: A very consistent species in colour and structure. The minor variations observed are noted in the description.

Affinities: *D. fusconota* has a superficial resemblance to several of the darker species of the *rufescens*-group. *D. incerta* (Stein) has the pleura yellow and hind femur without *pv* setae. *D. sabroskyi* Snyder, known to me from the description only, is similar in having a mainly dark thorax and numerous *av* and *pv* setae on hind femur. It differs from *fusconota* in having dark coxae, trochanters and tibiae; without clearly defined dorsal vittae on mesonotum; abdomen mainly black in ground-colour; scutellum black. *D. fusconota* appears to be closest to *nigroscuta* Bohart and Gressitt, which is known to me from descriptions only and which differs in details of colour and leg chaetotaxy, in particular hind femur with only 1–2 *pv* setae.

## ***Dichaetomyia apicalis*** (Stein)

(Text-figs. 97, 100, 103)

*Spilogaster apicalis* Stein, 1904 : 103. Holotype ♂, JAVA. In the Zoölogisch Museum der Universiteit van Amsterdam. [Examined.]

This species is known to me from the holotype and from a good series of both sexes in the BMNH. I consider it to be a strictly Oriental species, and doubt if it will be found to the East of the Weber Line. A female from Soembawa, identified by Hennig (1952 : 83), is in my opinion not *apicalis*: it has the *ori* above the lower pair directed inwards, as in *soror* but not as in *apicalis* and *arrogans*. I have not seen *apicalis* from New Guinea. I have been unable to study any material from Micronesia identified as *apicalis* by Snyder (1965 : 303).

*D. apicalis* is very closely related to *arrogans* and *soror*, and will be traced to couplet 21 in the key.

It differs from *soror* by the following characters: hind tibia with 2 *av* setae, at least the triangular sclerite below infra-alar bulla brown, more numerous scutellar setulae below the level of the strong setae, abdominal setae less numerous, auxiliary propleural and prostigmatal setae weak to absent, ♀ *ori* above the lower pair directed forwards and inwards.

It is most closely related to *arrogans* by reason of the weak auxiliary prostigmatal seta, weak abdominal setae with no discal row on tergite 5, hind tibia with 2 *av* setae, ♀ *ori* above the lower pair directed forwards and inwards. It differs from *arrogans* by the following characters: mesonotum densely dusted, especially before suture, with only traces of undusted vittae (with only thin dust in *arrogans*, through *prst dc* setae, along suture, and through *post ia* setae); hypopleuron with hairs below spiracle (bare in *arrogans*); scutellum with more numerous setulae, about 13, below the level of the lateral setae (fewer in *arrogans*, 5–9); palpi entirely brown (at most basal part brown in *arrogans*); post-ocular setulae and beard entirely dark (both partly golden in *arrogans*).

The male 5th sternite is unlike that of *soror* and *arrogans* (Text-fig. 97). It has the median cleft well-developed, and lacks stout setulae medially, on either side of this cleft. The cercal plate possesses rudimentary " nipples " that are scarcely indicated in *soror* and *arrogans*.

## ***Dichaetomyia rufescens*** (Stein)

*Spilogaster rufescens* Stein, 1900*b* : 134. Lectotype ♂, NEW GUINEA: Simbang, Huon-Golf. In the Zoologisches Museum der Humboldt-Universität zu Berlin. [Examined.] [Designated by Pont, in press.]

This species is known to me only from a few males, from New Guinea. It is very closely related to *arrogans* and *soror*, and will be traced to couplet 21 in the key.

It differs from *soror* by the following characters: hind tibia with 2 *av* setae; hypopleuron bare below spiracle; beard with many golden setae; scutellum with more numerous setulae, 13–14, below the level of the strong setae.

It differs from *arrogans*, to which it is most closely related, by the following characters: post-ocular setulae entirely golden below the upper row (black above in *arrogans*); palpi entirely yellow (brown at base in *arrogans*); scutellum with more numerous setulae, 13–14, below the level of the strong setae (fewer in *arrogans*, 5–9); mesonotum densely dusted, especially before suture, with only traces of undusted vittae (with only thin dust in *arrogans*, through *prst dc* setae, along suture and through *post ia* setae).

I have not had a male available for a genital dissection. In dry specimens, however, a median cleft is visible on the 5th sternite, as in *apicalis* (cf. Text-fig. 97).

## *Dichaetomyia arrogans* sp. n.

(Text-figs. 98, 101, 104)

Diagnosis: *D. arrogans* can be distinguished from the other Australian species of the *rufescens*-group by the yellow palpi, hind femur without *pv* setae in the male, and fore tarsi not dilated in female.

♂. *Head:* Frons slender, at narrowest point eyes separated by slightly over diameter of anterior ocellus. Eyes virtually bare, with only the usual microscopic pubescence; upper inner facets enlarged as usual but not conspicuously so. Ocellar setae well developed, longer than anterior *prst dc*, in some individuals slightly shorter. Vertical setae short, only slightly longer than the adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row, which are dark above but become golden below. Parafrontalia, parafacialia and face silvery white pruinose; genae black in ground-colour, brownish grey pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to twice diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible, an elongate one before ocellar tubercle and a short one at lunula, visible as a seam or obsolete on median one-third to half of frons. 3–4 pairs of weak inclinate *ori*, with several hair-like interstitials, all on lower third of frons; 1(–2) pairs of hair-like reclinate *ors* just before ocellar tubercle, sometimes with a tiny proclinate pair in front of them. Antennae and basal quarter of arista yellow; 3rd segment pale yellow, white pruinose. 3rd segment three times as long as broad, in frontal view reaching or almost reaching epistoma. Arista with long regular plumosity, the longest of which equals length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia largely obscured; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending to at least midway level of 3rd antennal segment. Mentum of proboscis brown. Palpi compressed, rather slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum yellow in ground-colour, the triangular sclerite below infra-alar bulla seamed with brown. Viewed from above and behind, mesonotum undusted except for some thin whitish dust through *prst dc* setae, a fascia running laterad along suture, and a vitta through *post ia*; this dust sometimes very indistinct. Scutellum appearing undusted. Pleura virtually undusted. Anterior spiracle pale yellow. Mesonotum with the ground-setulae rather short and sparse, except those between the *dc*; all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair well-developed, placed behind, on or in front of the transverse level of *prsc dc* and closer to each other than to the *dc*; *prst* setulae irregularly 10- to 11-serial. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one twice length of the anterior one. 2 *ia*, the anterior one weak to strong. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity with a few golden to dark hairs. Supra-squamal ridge bare. Prosternum pale setulose. Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with a weak auxiliary seta below, the auxiliary prostigmatal very fine or even absent; the former surrounded by few, the latter by numerous, pale setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with dark setulae around the bases of both setae, those around anterior seta sometimes pale. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner; ground-setulae almost entirely pale. Infra-alar bulla yellow, bare. Pteropleuron with the setulae dark, some of the lower ones pale-tipped or wholly pale; those on subalar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. Vallar ridge bare or haired on anterior part. *Stpl* 1 + 2, the lower one a little weaker than anterior one and much closer to posterior one than to anterior one. Hypopleuron with some pale hairs on metepisternum. Metathoracic spiracle moderate, subtriangular, with a few setulae on lower and posterior margins. Squamopleuron with a few pale and dark hairs. Scutellum with a very strong apical and sub-basal lateral pair of setae. Disc with rather short dense setulae, several stronger ones apically; 5–9 setulae descending in an irregular row just below the level of the strong setae, otherwise bare laterally and ventrally. *Legs:* Yellow, tarsi becoming brown after metatarsus. Tarsi unremarkable. Fore femur with a complete row of *pv* setae. Mid femur without ventral setae, though a few of the *pv* ground-setulae in basal third may be rather longer, equal to half femoral depth; 3 (rarely 4) *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with 2–4 weak *av* setae in apical third, not as long as femoral depth, otherwise without ventral setae; *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 *ad* seta; some of the *pd* ground-setulae more erect in apical half; *d* preapical seta subequal to tibial depth, shorter than the *ad*. *Wings:* Rather yellowish tinged, especially costally and basally, sometimes apical half smoky. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein with a few fine hairs above and below. Small cross-vein placed below or basad of the point where vein 1 enters costa. Hind cross-vein oblique, sinuate. Vein 1 bare. Vein 3 bare above; below with a few setulae on the node at base or just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae and margins rather deep yellow, fringes yellow. Knob of halteres rather deep yellow. *Abdomen:* Ground-colour basically yellow, with variable dark markings: tergite 1 + 2 yellow to dark; tergites 3 and 4 partly to entirely black, rarely almost entirely yellow; tergite 5 yellow or yellow only on posterior third; the dark areas with a rather violet sheen. Sternites 1–4 yellow sometimes also part of sternite 5. In posterior view, tergites with the dark areas thinly and uniformly grey dusted, otherwise appearing rather matt. Macrochaetae quite well-developed and erect: tergite 3 with a lateral marginal, tergite 4 with some lateral discals and marginals, tergite 5 with some lateral discals and a marginal row. Sternite 1 dark to pale setulose. *Genitalia:* Text-figs. 98, 101, 104. *Measurements:* Length of body, 6·0–7·5 mm. Length of wing, 5·5–7·0 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, almost as long as 2nd *prst dc* seta, directed forwards and slightly outwards. *Vti* strong, directed upwards and slightly inwards, longer than the outcurved *vte*; *vte* 2–3 times as long as an adjacent post-ocular setula, longer than the fine outcurved *pvt*. Parafrontal pruinosity becoming thinner and greyer in upper half, virtually subshining black alongside ocellar tubercle. Interfrontalia black in ground-colour, brick-red in immature specimens; viewed from below, grey pruinose with the frontal triangle tinged with brownish; frontal triangle otherwise visible as a subshining black streak almost reaching to lunula. Parafrontalia slender, not broadening much except just before lunula; at middle a parafrontale equal to one and a half times diameter of anterior ocellus and quarter width of interfrontalia, at lunula less than width of interfrontalia. Interfrontalia with the margins diverging slightly from vertex to lunula, at lunula broader than a parafrontale (as in *spinuligera*, Text-fig. 27), bare. 1 pair of strong inclinate *ori* at lunula, with 3–4 weaker pairs above, all on lower half of frons; 2 pairs of strong reclinate *ors*, the upper one twice as long as lower one and placed closer to it than to *vti*; parafrontalia otherwise with a few short proclinate setulae on lower half. 3rd antennal segment yellow, weakly infuscated in apical half. Palpi rather broader. *Thorax:* Viewed from above and behind, mesonotum with the dust very reduced, usually only the lateral fascia along suture present; sometimes with traces of a faint dusted median vitta before suture. Notopleuron sometimes bare around 1st seta. Hypopleuron usually with some pale hairs below spiracle. Scutellum with 7–9 setulae just below the level of the strong setae. *Legs:* Tarsi rather paler. *Wings:* Hind cross-vein usually less sinuate. Vein 3 sometimes with a setula above on the node at base. Lower squama often rather deeper yellow on outer part. *Abdomen:* Ground-colour varying as in male; often almost entirely yellow. Macrochaetae reduced, fewer and weaker: virtually absent except for a lateral discal and marginal row on tergite 5, and a weak lateral discal and marginal on tergite 4. *Measurements:* Length of body, 6·0–7·5 mm. Length of wing, 5·5–7·0 mm.

Holotype ♂. QUEENSLAND: Iron Range, 11.iv.1964 (*I. F. B. Common & M. S. Upton*), CSIRO.

Paratypes, 9 ♂, 21 ♀. QUEENSLAND: Upper Mulgrave River, 10 miles Goldsborough Road, 3 ♂, 1 ♀, 9.v.1967 (*D. H. Colless*), 1 ♂ BMNH, 2 ♂, 1 ♀ CSIRO; Mt. Edith Forest Road, 1 mile off Danbulla Road, 1 ♂, 6.v.1967 (*D. H. Colless*), CSIRO; Mossman Gorge, 1 ♂, 24.iv.1967 (*D. H. Colless*), CSIRO; Whitfield Range Forest Reserve, Cairns, 1 ♂, 19.iv.1967 (*D. H. Colless*), CSIRO; Crystal Cascades, Cairns, 2 ♂, 1 ♀, 19.iv.1967 (*D. H. Colless*), 1 ♂ BMNH, 1 ♂, 1 ♀ CSIRO; Tolga, 1 ♀, 30.iv.1955 (*K. R. Norris*), BMNH; Mt. Bartle Frere, East base, 80 ft., 1 ♀, 24.iv.1955 (*K. R. Norris*), BMNH; 1 mile E. of Kuranda, 1 ♀, 4.v.1955 (*Norris & Common*), CSIRO; Tinaroo Dam, Atherton Tbld, 1 ♀, 7.xii.1965, CSIRO; 10 miles S. of Daintree, 1 ♀, 25.iv.1967 (*D. H. Colless*), CSIRO; Yungaburra (State Forest 452), 1 ♀, 29.iv.1967 (*D. H. Colless*), CSIRO; Kuranda Range State Forest, 1 ♀, 20.iv.1967 (*D. H. Colless*), CSIRO; Mulgrave River, 4 miles W. of Gordonvale, 1 ♀, 13.i.1967 (*D. K. McAlpine*), Aust. Mus.; Thornton Range, near Daintree River, 1 ♀, 7.i.1967 (*D. K. McAlpine & G. Holloway*), Aust. Mus.; The Intake via Redlynch, 2 ♀, 30.xii.1966 (*D. K. McAlpine & G. Holloway*), Aust. Mus.; Kuranda, 1 ♀, ix.1910 (Brunetti Coll.), BMNH; Kuranda, 1 ♀, x.1910 (Brunetti Coll.), BMNH; 4 ♀ (Brunetti Coll.), BMNH; Kuranda, 1 ♀, 11.iii.1956 (*J. L. Gressitt*), Bishop; Deeral, ex Acmena macrocarpa, 1 ♂, 27.vi.1950 (*W. A. Smith*), Qld. Dept. Pr. Ind.; Cairns, ex Fagraea cambagei, 1 ♀, 27.vi.1950 (*W. A. Smith*), Qld. Dept. Pr. Ind.

Distribution and biology: Australia: Queensland. An uncommon species.

This species occurs in lowland rain forest. It is not clear whether the data associating the species with *Acmena macrocarpa* White, 1942 (Myrtaceae), and *Fagraea cambagei* Domin, 1928 (Potaliaceae), refer to breeding records or to adult habits: I assume the latter. Life-history and immature stages unknown.

Variation: The abdominal colour varies, as noted in the description, from almost entirely dark through various degrees of banding to entirely yellow. One female (Tinaroo Dam) has the mesonotum rather generally but thinly grey dusted. Mid femur rarely has an *ad* preapical seta: in the male, it is present on both sides in one specimen, on one side only in one specimen, and absent in all others; in the female, it is present on one side only in one specimen, and absent in all others. The hind tibia has 2–3 *av* setae in all specimens, except for one male which has one on one side and one female which has one on both sides.

Affinities: *D. arrogans* is most closely related to the Australian *soror*, the New Guinea *rufescens* and the Oriental *apicalis*. Its affinities with these species are shown in the key (p. 209) and in the notes under *apicalis* and *rufescens*. The structure of the male 5th sternite (Text-fig. 98) differs from that of all three species by the virtual absence of a deep median cleft.

### ***Dichaetomyia soror* sp. n.**

(Text-figs. 99, 102, 105)

*Dichaetomyia apicalis* (Stein); Malloch, 1925 : 326 [misidentification].
*Dichaetomyia apicalis* (Stein); Lee, Crust & Sabrosky, 1956 : 307 [misidentification].

Diagnosis: *D. soror* can be distinguished from the other Australian species of the *rufescens*-group by the dark palpi, entirely yellow mesonotum and legs, and the absence of *pv* setae on hind femur.

♂. *Head:* Frons slender, at narrowest point eyes separated by less than diameter of anterior ocellus. Eyes virtually bare, with only the usual microscopic pubescence; upper inner facets enlarged as usual but not conspicuously so. Ocellar setae fine, not as long as anterior *prst dc*. Vertical setae short, only slightly longer than adjacent post-ocular setulae. Post-ocular setulae very short, with several scattered setulae below the upper row, which are entirely black. Parafrontalia, parafacialia and face silvery white pruinose; genae black in ground-colour, greyish pruinose. Interfrontalia, viewed from below, with the visible parts grey pruinose. Parafrontalia slender, at lunula equal to one and a half times diameter of anterior ocellus. Interfrontalia reduced, two small triangles visible before ocellar tubercle and at lunula, visible as a seam or even obsolete on median third of frons. 4–5 pairs of inclinate *ori*, decreasing in size above the strong pair at lunula, on lower two-fifths of frons; 1 pair of hair-like reclinate *ors* just before ocellar tubercle. Antennae and basal third of arista yellow; 3rd segment pale yellow, white pruinose. 3rd segment three times as long as broad, in frontal view almost reaching epistoma. Arista with long regular plumosity, the longest of which equals length of 3rd antennal segment. Parafacialia slender, opposite insertion of arista equal to diameter of anterior ocellus. Parafacialia and genae bare. In lateral view, parafrontalia and parafacialia largely obscured; vibrissal angle projecting slightly beyond profrons. Genae slender; the depth below lowest eye-margin equal to less than width of 3rd antennal segment. Peristomal setae rather dense, especially behind. Facial ridges with short hairs ascending to midway level of 3rd antennal segment. Mentum of proboscis dark brown. Palpi compressed, rather slender, weakly clavate towards tips. *Thorax:* Thorax and scutellum entirely yellow in ground-colour. Viewed from above and behind, mesonotum rather densely whitish dusted, with thinly dusted or undusted markings as follows: a pair of paramedian vittae mesad of the *dc*, from neck to behind suture where they become obsolescent; a pair of *prst* patches between *ph* and *dc*; a pair of *post* vittae between *ia* and *dc*; and a pair of vittae through *sa*. Scutellum appearing undusted, in extreme posterior view with some dull dust apparent. Pleura virtually undusted. Anterior spiracle pale yellow. Mesonotum with the ground-setulae rather short and sparse, except those between the *dc*; all thoracic ground-setulae black unless otherwise stated. *Acr* 0 + 1, the single (*prsc*) pair well-developed, placed behind the transverse level of *prsc dc* (on this level in the male from East Point) and closer to each other than to the *dc*; *prst* setulae irregularly 8- to 9-serial. 2 *h*, the outer one one and a half times length of the inner one. 2 *ph*, the posterior one one and a half times length of the anterior one. 2 *ia*, the anterior one hair-like. 2 *sa*, the posterior one weak. Post-alar callus with 2 setae, with setulae present on the ridge between inner seta and scutellum. Post-alar declivity with a few pale hairs. Supra-squamal ridge bare. Prosternum pale setulose, sometimes brown setulose (in two of every five specimens). Propleural depression bare. 1 propleural and 1 prostigmatal seta, each with a well-developed auxiliary seta below; the former surrounded by few, the latter by numerous, pale and dark setulae. 1st *npl* longer and stronger than 2nd; disc of notopleuron with dark setulae around the base of posterior seta, and pale or dark ones around the base of anterior seta. Mesopleuron with 4 strong setae in caudal row, and a conspicuous black setula in upper anterior corner; ground-setulae entirely dark. Infra-alar bulla yellow, bare. Pteropleuron with the setulae mainly black, several of those below the sub-alar ridge brown to golden; those on sub-alar ridge confined to anterior part, descending down to sternopleural and hypopleural margins. Vallar ridge with some pale, rarely dark, hairs on anterior part, bare in one male from Earl Hill. *Stpl* 1 + 2, the lower one usually weaker than anterior one and much closer to posterior one than to anterior one. Hypopleuron with a few pale or dark hairs on metepisternum. Metathoracic spiracle moderate, subtriangular, with a few setulae on lower and posterior margins. Squamopleuron with pale or dark hairs. Scutellum with a very strong and sub-basal lateral pair of setae. Disc with rather short dense setulae, several stronger ones apically; 4–5 setulae descending just below the level of the strong setae, otherwise bare laterally and ventrally. *Legs:* Yellow, metatarsi dull to brown, other tarsi brown; sometimes hind tibia dark. Tarsi unremarkable. Fore femur with a complete row of *pv* setae. Mid femur without *av* or *pv* setae, though the ground-setulae rather longer in basal half; 3 *d-p* preapical setae. Mid tibia with 2 *p* setae. Hind femur with 3–4 *av* setae in apical third, the longest equal to femoral depth, and with or without 2–3 short *pv* setae around middle, equal to half femoral depth, otherwise bare on ventral surfaces; *ad* row complete; 1 *d* and 1 *pd* preapical setae. Hind tibia with 1 *ad* seta; some of the *pd* ground-setulae more erect in apical half, with a rather strong one at about level of the *ad*; *d* preapical seta subequal to tibial depth, shorter than the *ad*. *Wings:* Clear, weakly yellowish costally and basally; sometimes weakly smoky, and yellower costally. Epaulet and basicosta yellow. Subcostal sclerite bare. Costa setulose ventrally as far as the apex of vein 2, the spine inconspicuous. Stem-vein with a few tiny pale hairs at base above (bare in one male from Earl Hill), and a few hairs below. Small cross-vein placed basad of the point where vein 1 enters costa. Hind cross-vein oblique, sinuate. Vein 1 bare. Vein 3 bare above, rarely with a setula on the node at base; below with a few setulae on the node at base and just beyond. Vein 4 inclined weakly forward towards vein 3 in apical section. Squamae and margins yellow, lower one deeper, fringes pale. Knob of halteres deep yellow. *Abdomen:* Ground-colour yellow, with variable dark markings: tergites 4 and 5, or only tergite 5, with a pair of small dark lateral spots. Sternites yellow. In posterior view, tergites thinly whitish to greyish dusted except on hind-margins. Macrochaetae well-developed and erect: tergite 3 with some lateral marginals, tergite 4 with some lateral discals and a marginal row, tergite 5 with discal and marginal rows. Sternite 1 dark to pale setulose. *Genitalia:* Text-figs. 99, 102, 105. *Measurements:* Length of body, 6·0–7·0 mm. Length of wing, 5·5–6·5 mm.

♀. Differs from the male as follows. *Head:* Eyes broadly separated; frons at middle less than an eye-width, broadening gradually to lunula. Upper inner eye-facets not enlarged. Ocellar setae strong, slightly longer than anterior *prst dc* seta, directed forwards and slightly outwards. *Vti* strong, directed upwards and slightly inwards, slightly longer than the outcurved *vte*; *vte* twice as long as an adjacent post-ocular setula, longer than the outcurved *pvt*. Parafrontal pruinosity becoming thin and grey to brown in upper half of frons. Interfrontalia black in ground-colour; viewed from below, grey pruinose with the frontal triangle weakly brownish tinged; frontal triangle otherwise visible as a subshining black streak extending three-quarters distance from anterior ocellus to lunula. Parafrontalia slender, broadening gradually towards lunula; at middle a parafrontale equal to two to two and a half times diameter of anterior ocellus and quarter width of interfrontalia, at lunula broader than width of 3rd antennal segment. Interfrontalia broadest at middle of frons, at lunula a little broader than a parafrontale (as in *fusconota*, Text-fig. 26), bare. 1 pair of strong inclinate *ori* at lunula, with 3–4 weaker pairs above them, all on lower three-fifths of frons; 2 pairs of strong reclinate *ors*, the upper pair stronger and placed closer to lower pair than to *vti*; parafrontalia otherwise with short proclinate setulae from *ors* to lunula. 3rd antennal segment rather infuscated beyond arista. Parafacialia broader, opposite insertion of arista equal to almost twice diameter of anterior ocellus. *Thorax:* Viewed from above and behind, mesonotum undusted, rarely with a small weak median spot of white dust at neck. Scutellum undusted. *Prsc acr* placed on or in front of the transverse level of *prsc dc*. Inner *h* and anterior *ph* weaker. Anterior *ia* sometimes absent. Propleural and prostigmatal ground-setulae dark, or dark and pale, or pale. Notopleuron bare around 1st seta, rarely with some dark setulae. Hypopleuron with dark hairs below spiracle. Squamopleuron with dark setulae. Scutellum with 1–5 setulae just below the level of the strong setae. *Legs:* Hind tibia sometimes darkened. Hind femur with 1 strong and 1–3 weak preapical *av* setae. *Wings:* Usually rather conspicuously smoky. Stem-vein bare above. *Abdomen:* Ground-colour yellow, with variable dark markings: tergites 1 + 2 and 3 yellow; tergite 4 yellow, or with a weak to strong dark median crescent; tergite 5 yellow to dark with a pale mid-line or with large spots not quite meeting medially. Viewed from behind, virtually undusted. Macrochaetae reduced: tergite 5 with erect discal and marginal rows, the marginal row often confined to a few laterals, otherwise tergites 3 and 4 with discal and marginal setae short and confined to lateral parts of tergites. *Measurements:* Length of body, 5·5–6·5 mm. Length of wing, 5·0–6·0 mm.

Holotype ♂. QUEENSLAND: Palm Island, 20.xii.1930–6.i.1931 (*I. M. Mackerras*), CSIRO.

Paratypes, 12 ♂, 11 ♀. NORTHERN TERRITORY: Lee Point, Darwin, 1 ♂, 3 ♀, 7.iii.1967 (*M. S. Upton*), 1 ♀ BMNH, 1 ♂, 2 ♀ CSIRO; East Point, Darwin, 1 ♂, 12.vi.1964 (*K. R. Norris*), CSIRO; Howard Springs, 4 ♀, 12.vi.1964 (*K. R. Norris*), 2 BMNH, 2 CSIRO; Arnhem Land, Maningrida, 5 m., Malaise-trap, 1 ♂, 1 ♀, 18 and 19.iii.1961 (*J. L. & M. Gressitt*), Bishop.

QUEENSLAND: Palm Island, 2 ♂, 1 ♀, xii.1931 (*Mackerras*), 1 ♂ BMNH, 1 ♂, 1 ♀ CSIRO; Earl Hill, north of Cairns, 6 ♂, 8.v.1967 (*D. H. Colless*), 2 BMNH, 4 CSIRO; Mossman, 1 ♀, 25.iii.1967 (*M. S. Upton*), CSIRO; Mt. Bartle Frere, East base, 80 ft., 1 ♀, 25.iv.1955 (*K. R. Norris*), CSIRO; Cairns, coll ex cage, 1 ♂ (*J. F. Illingworth*), USNM [det. by Malloch as *apicalis*].

Distribution and biology: Australia: Northern Territory and Queensland. An uncommon species.

This species occurs primarily in lowland rain forest, even in residual patches, and has also been found in scrub near the sea-shore and in riverine rain forest in savannah woodland. It has been collected in Malaise-traps.

Life-history and immature stages unknown.

Variation: The colour of the prosternal setulae may be pale or dark, dark in 40% of the specimens examined, and varies within populations. The hypopleural hairs below the spiracle are usually yellow in the male and dark in the female. Hind tibia and hind metatarsus are usually yellow, as on the other legs, but are sometimes infuscated or even black. The male from East Point has the few *pv* setulae on hind femur rather stronger and more numerous than usual, and the male from Arnhem Land has 2 *av* setae on hind tibia. One of the males from Earl Hill has the vallar ridge bare, hypopleuron bare below spiracle, stem-vein bare above, and mid femur with *a* and *ad* preapical setae.

The dark markings on the abdomen vary considerably and it is difficult to establish a consistent pattern. In the male, tergites 4 and 5, or tergite 5 alone, have a pair of dark lateral spots, but in one male the hind-margin of tergite 3 and all of tergites 4 and 5 are dark. In the female, some specimens have the abdomen entirely immaculate; more usually, tergite 4 and 5 are extensively darkened in the form of spots, triangles or bands, and in some specimens even tergite 3 is extensively darkened and tergite 4 and 5 entirely dark.

Affinities: *D. soror* is most closely related to the Australian *arrogans*, the New Guinea *rufescens* and the Oriental *apicalis*. Its affinities with these species are shown in the key (p. 209) and in the notes under *apicalis* and *rufescens*. The male 5th sternite is very characteristic and is most similar to that of *vicaria* (Walker) and related species: the median cleft is flanked by rather short stout setulae (Text-fig. 99).

Discussion: Malloch (1925 : 326) recorded *apicalis* (Stein) from Australia on the basis of one male from Cairns, Queensland. This male is in the USNM. I have studied it and find that it belongs to my species *soror* and not to *apicalis*.

## CATALOGUE OF AUSTRALIAN DICHAETOMYIINI

Names in synonymy indented. Misidentifications not included.

### Tribe ***DICHAETOMYIINI*** Emden, 1951

### ***DICHAETOMYIA*** Malloch, 1921

Type-species: *Dichaetomyia polita* Malloch, 1921, nec Stein, 1900 (= *emdeni* n. n.), by original designation and monotypy.

*quadrata*-group
*iohannis* Pont, 1967

*armata*-group
- *longiseta* Pont, 1967
- *norrisi* Pont, 1967
- *significans* (Walker, 1859)
  - *helomyzina* (Stein, 1900) syn. n.
  - *spinipes* (Stein, 1918) syn. n.

*impar*-group
*parimpar* sp. n.
*breviseta* sp. n.

*vicaria*-group
- *terraereginae* Malloch, 1925
- *rufaeformis* sp. n.
- *megophthalma* Malloch, 1925
- *australis* sp. n.
- *vicaria* (Walker, 1859)
  - *rufa* (Stein, 1900) syn. n.
  - *rufa* var. *personata* Bezzi, 1928 syn. n.
- *flavohirta* Malloch, 1925
- *reversa* (Walker, 1849)
  - *luteohirta* Malloch, 1925 syn. n.
- *fulvohirta* sp. n.

*polita*-group
*collessi* sp. n.

*demens*-group
*aseta* sp. n.

*rufescens*-group
*spinuligera* sp. n.
*fusconota* sp. n.
*arrogans* sp. n.
*soror* sp. n.

## REFERENCES

Bezzi, M. 1928. *Diptera Brachycera and Athericera of the Fiji Islands, based on material in the British Museum (Natural History).* viii + 220 pp. British Museum (Natural History), London.

Curran, C. H. 1928. Diptera of the American Museum Congo Expedition. Part II. *Bull. Am. Mus. nat. Hist.* **67** : 327–399.

Emden, F. I. van. 1942. Keys to the Muscidae of the Ethiopian Region: *Dichaetomyia*-group. *Ann. Mag. nat. Hist.* (11) **9** : 673–701 and 721–736.

—— 1951. Muscidae, C.—Scatophaginae, Anthomyiinae, Lispinae, Fanniinae and Phaoniinae. *Ruwenzori Exped.* 1934–35 **2** (6) : 325–710. British Museum (Natural History), London.

—— 1965. Diptera 7, Muscidae, Part 1. *Fauna of India and the adjacent countries.* xiv + 647 pp. Government of India, Delhi.

Enderlein, G. 1927. Dipterologische Studien. XVIII. *Konowia* **6** : 50–56.

Given, B. B. 1968. List of Insects collected on Niue Island during February and March, 1959. *N. Z. Ent.* **4** : 40–42.

Hennig, W. 1952. Dipteren von den Kleinen Sunda-Inseln aus der Ausbeute der Sunda-Expedition RENSCH. IV. Fam. *Muscidae*. *Beitr. Ent.* **2** : 55–93.

—— 1955–64. 63b, Muscidae. *Fliegen palaearkt. Reg.* 1,110 pp. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart.

—— 1965. Vorarbeiten zu einem phylogenetischen System der Muscidae (Diptera: Cyclorrhapha). *Stuttg. Beitr. Naturk.* Nr. 141 : 100 pp.

Hori, K. & Kurahashi, H. 1967. Three Species of Japanese *Dichaetomyia*, with Description of Two New Species (Family Muscidae, Diptera). *Sci. Rep. Kanazawa Univ.* **12** : 67–74.

Lee, D. J., Crust, M. & Sabrosky, C. W. 1956. The Australasian Diptera of J. R. Malloch. *Proc. Linn. Soc. N.S.W.* **80** [1955] : 289–342.

Malloch, J. R. 1921*a*. Exotic Muscaridae (Diptera).—I. *Ann. Mag. nat. Hist.* (9) **7** : 161–173.

—— 1921*b*. Exotic Muscaridae (Diptera).—II. *Ann. Mag. nat. Hist.* (9) **7** : 420–431.

—— 1924. Notes on Australian Diptera. No. II. *Proc. Linn. Soc. N.S.W.* **49** : 138–146.

—— 1925. Notes on Australian Diptera with descriptions of thirteen new species. *Aust. Zool.* **3** : 322–338.

—— 1928*a*. Exotic Muscaridae (Diptera).—XXI. *Ann. Mag. nat. Hist.* (10) **1** : 465–494.

—— 1928*b*. Fauna sumatrensis (Beitrag Nr. 56). Family *Muscidae* (Dipt.). *Ent. Mitt.* **17** : 290–303 and 310–336.

—— 1929*a*. Fauna Buruana. Diptera, Fam. Muscidae. *Treubia* **7** : 390–408.

—— 1929*b*. Muscidae. *Insects Samoa* **6** (3) : 151–175. British Museum (Natural History), London.

—— 1930. Exotic Muscaridae (Diptera).—XXIX. *Ann. Mag. nat. Hist.* (10) **5** : 465–484.

Meijere, J. C. H. de. 1906. Résultats de l'Expédition Scientifique Néerlandaise à la Nouvelle-Guinée en 1903 sous les auspices de Arthur Wichmann, chef de l'expédition. Diptera. *Nova Guinea* **5** (Zoologie) : 67–99.

Pont, A. C. 1966*a*. Notes on the Muscidae of New Guinea (Diptera). I. The types of Francis Walker. *Ann. Mag. nat. Hist.* (13) **9** : 87–99.

—— 1966*b*. Notes on the Muscidae of New Guinea (Diptera). II. Species described by Stein in the Annali Mus. Civ. St. Nat. " G. Doria ", Genova (1900). *Annali Mus. civ. Stor. nat. Giacomo Doria* **76** : 93–102.

—— 1967*a*. Studies on Australian Muscidae (Diptera). I. Some species of *Dichaetomyia* Malloch. *Aust. J. Zool.* **15** : 619–640.

—— 1967*b*. Noona Dan Papers No. 43. Some Muscidae (Diptera) from the Philippine Islands and the Bismarck Archipelago. I. The Genus *Myiophaea* Enderlein. *Ent. Meddr* **35** : 105–124.

—— 1968. Notes on the Muscidae of New Guinea (Diptera). IV. Species described by Stein from 1910 to 1920. *Ent. Ber., Amst.* **28**: 166–174.

—— In press. Notes on the Muscidae of New Guinea (Diptera). III. Species described by Stein in 1900, Természetr. Füz., Volume 23. *Dt. ent. Z.*

Séguy, E. 1937. Muscidae. *Genera Insect.* **205**, 604 pp. Desmet-Verteneuil, Brussels.

Snyder, F. M. 1965. Muscidae. *Insects Micronesia* **13** (6) : 191–327. Bishop Museum, Honolulu.

Stein, P. 1900*a*. Einige dem Genueser Museum gehörige aus Neu-Guinea und Umgegend stammende Anthomyiden. *Annali Mus. civ. Stor. nat. Giacomo Doria* **40** : 374–395.

—— 1900*b*. Anthomyiden aus Neu-Guinea, gesammelt von Herrn L. Biró. *Természetr. Füz.* **23** : 129–159.

—— 1901. Die Walker'schen aussereuropäischen Anthomyiden in der Sammlung des British Museum zu London (Dipt.). *Z. syst. Hymenopt. Dipterol.* **1** : 185–221.

—— 1904. Einige neue javanische Anthomyiden. *Tijdschr. Ent.* **47** : 99–113.

—— 1909. Neue javanische Anthomyiden. *Tijdschr. Ent.* **52** : 205–271.

—— 1918. Zur weitern Kenntnis aussereuropäischer Anthomyiden. *Annls hist.-nat. Mus. natn. hung.* **16** : 147–244.

Stein, P. 1919*a*. Die Anthomyidengattungen der Welt, analytisch bearbeitet, nebst einem kritisch-systematischen Verzeichnis aller aussereuropäischer Arten. *Arch. Naturgesch.* **83** A 1 [1917] : 85–178.

—— 1919*b*. Zur Anthomyidenfauna Neu-Guineas. *Nova Guinea* **13** (Zoologie) : 199–211.

—— 1920. Anthomyiden aus Java, Sumatra, Waigeoe und Ceram. *Tijdschr. Ent.* **62** [1919], Suppl. : 47–86.

Steyskal, G. C. 1965. Notes on types of some species described in *Sciomyza* and *Tetanocera* by Loew, Walker and Van der Wulp (Diptera: Sciomyzidae, Muscidae, Neriidae, Pyrgotidae). *Studia ent.* **8** : 445–448.

Walker, F. 1849. *List of the specimens of Dipterous Insects in the collection of the British Museum* **4** : 689–1172. British Museum, London.

—— 1859. Catalogue of the Dipterous Insects collected in the Aru Islands by Mr. A. R. Wallace, with Descriptions of New Species. *J. Proc. Linn. Soc.* **3** : 77–131.

## INDEX

AETHIOPOMYIA, 199
  AGDESTIS, 199
ALLUAUDINELLA, 199
apicalis (Stein), 263, 269
apicalis (Stein) of authors, 269, 273
armata (Stein) of authors, 213, 214, 215, 217
arrogans sp. n., 209, 269, 270
aseta sp. n., 207, 260
atratula Malloch, 257
AURIA, 199
australis sp. n., 203, 230, 239

bifasciata (Stein), 260
breviseta sp. n., 202, 218, 224

canivitta (Walker), 219
carolina Synder, 260, 262
caucasica Pont, 209, 211
collessi sp. n., 207, 257

demens (Stein), 260
DICHAETOMYIA, 199

emdeni n. n., 199

flavohirta Malloch, 205, 206, 248, 254
fulvitarsis Malloch, 257
fulvohirta sp. n., 206, 255
fumicosta fumicosta Malloch, 230, 239, 241
fumicosta savaii Malloch, 230, 239, 241
fusciventris Emden, 257
fusconota sp. n., 207, 266

  GORDONIA, 199
GRAUERIA, 199

HARDYIA, 199
  helomyzina (Stein), 214, 215

impar (Stein), 218, 219
impar (Stein) of authors, 219, 224
incerta (Stein), 263, 268
indica (Walker), 257

johannis Pont, 200, 209, 210

latitarsis (Stein), 263, 266
leucoceros (Walker), 260
lombokensis Hennig, 263
longiseta Pont, 201, 211, 212
  LOPHOMALA, 199
  luteohirta Malloch, 251

  MACROXANTHOMYIA, 199
malayana malayana Malloch, 211
malayana tamil Emden, 211
mariana Snyder, 230, 239, 241
megophthalma Malloch, 203, 230, 238
  MYIOPHAEA, 199

  NEAVEIA, 199
nigrita Malloch, 257
nigriventris Malloch, 257
nigrolineata (Stein), 257
nigroscuta Bohart and Gressitt, 263, 268
norrisi Pont, 201, 211, 213
nubiana aureomarginata Emden, 209
nubiana nubiana (Bigot), 209, 223

OCHROMUSCA, 199

pallens (Stein), 219
  PANAGA, 199
parimpar sp. n., 198, 201, 218, 219
parviseta sp. n., 218, 228
peroe (Walker), 209, 211

phaeocnemis Emden, 209
polita Malloch, 199
polita (Stein), 199, 257
prolixa bioculata Emden, 230
prolixa pallidorsis Emden, 230
prolixa prolixa (Walker), 230
PYRELLINA, 199

quadrata monticola Emden, 209
quadrata quadrata (Wiedemann), 209, 211

reversa (Walker), 205, 206, 251, 255
RHYNCHOMYDAEA, 199
rigidiseta (Stein) of authors, 212, 213
rota Snyder, 263
  rufa (Stein), 242
  rufa var. personata Bezzi, 242, 248
rufaeformis sp. n., 203, 234, 237
rufescens (Stein), 263, 269

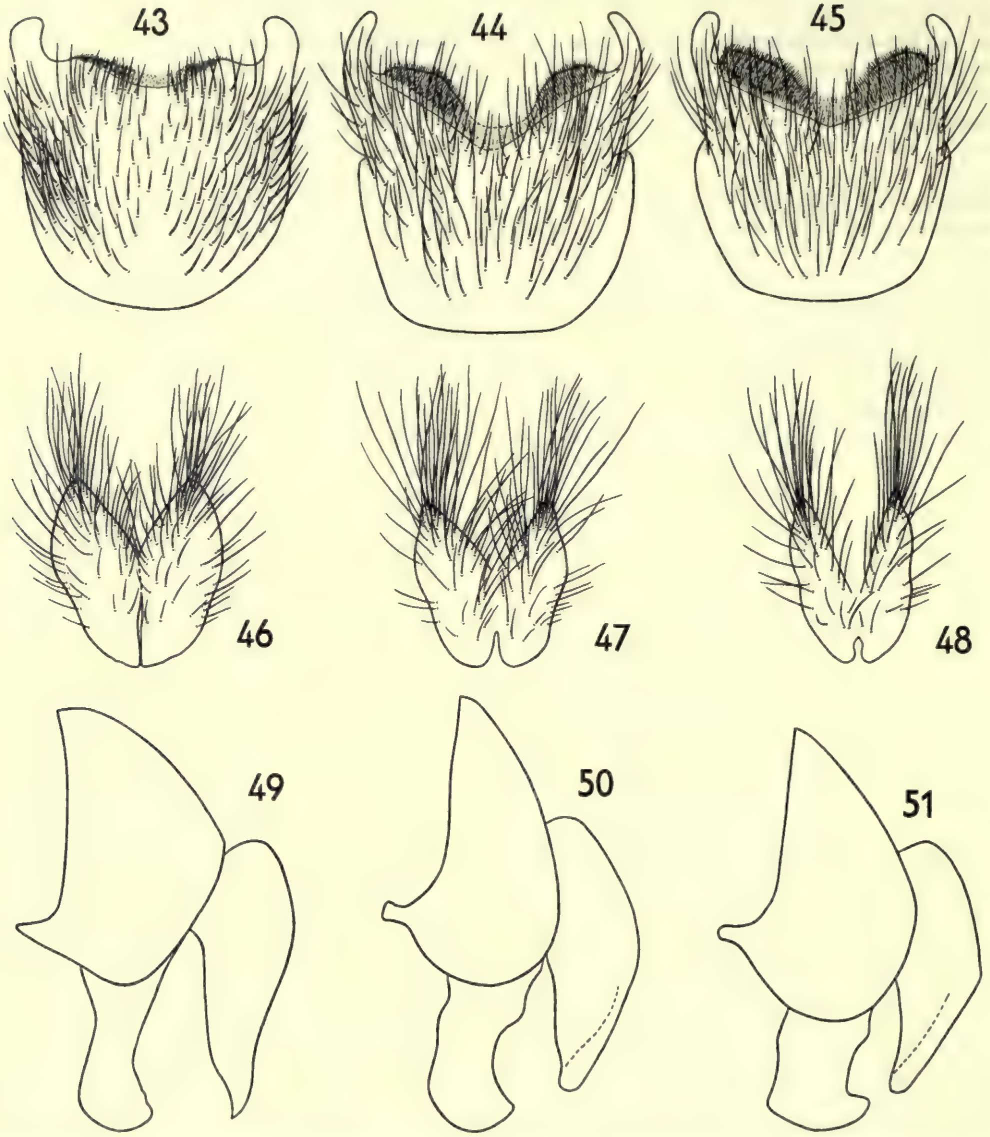
sabroskyi Snyder, 263, 268
saperoi Bohart and Gressitt, 230, 239, 241
scutellaris Malloch, 211
setulifera (Stein) of authors, 210, 211
significans (Walker), 201, 211, 214, 215
soror sp. n., 209, 269, 273
  spinipes (Stein), 214, 215
spinuligera sp. n., 207, 263

TAMILOMYIA, 199
terraereginae Malloch, 203, 231, 237
trukensis Snyder, 230, 239, 241

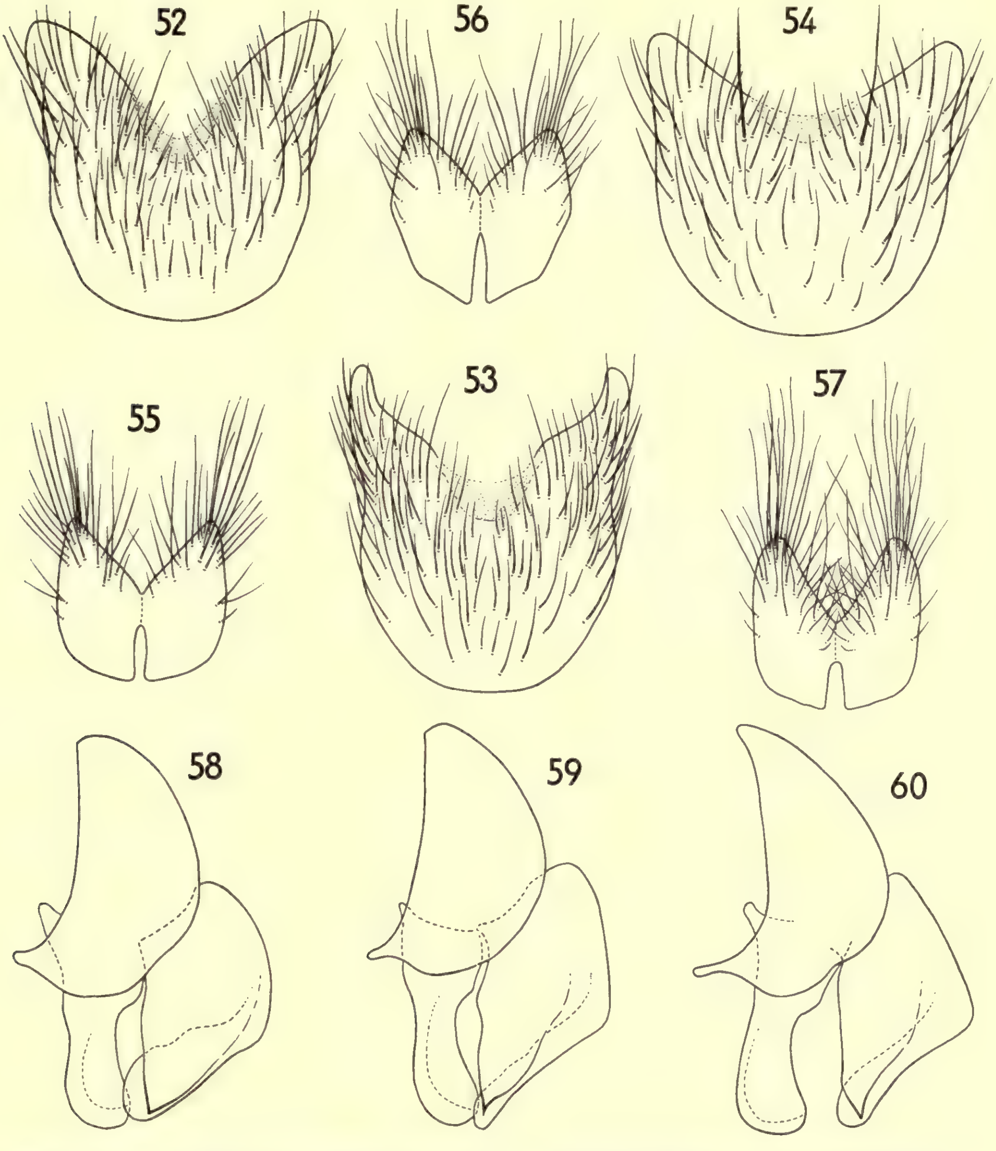
vicaria (Walker), 204, 242

yapensis Snyder, 230, 239

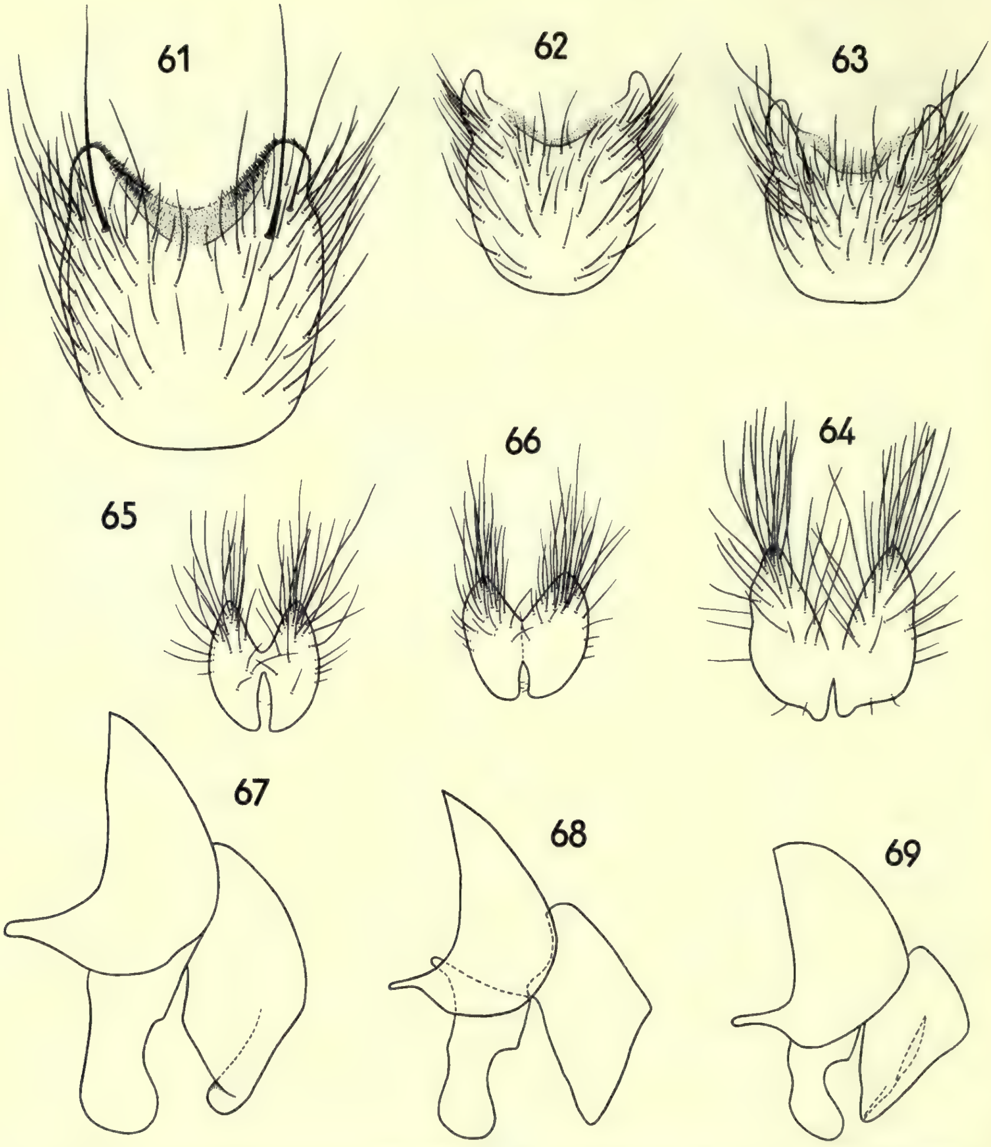
ADRIAN CHARLES PONT, B.A.(Oxon.)
*Department of Entomology*
BRITISH MUSEUM (NATURAL HISTORY)
CROMWELL ROAD
LONDON, S.W.7



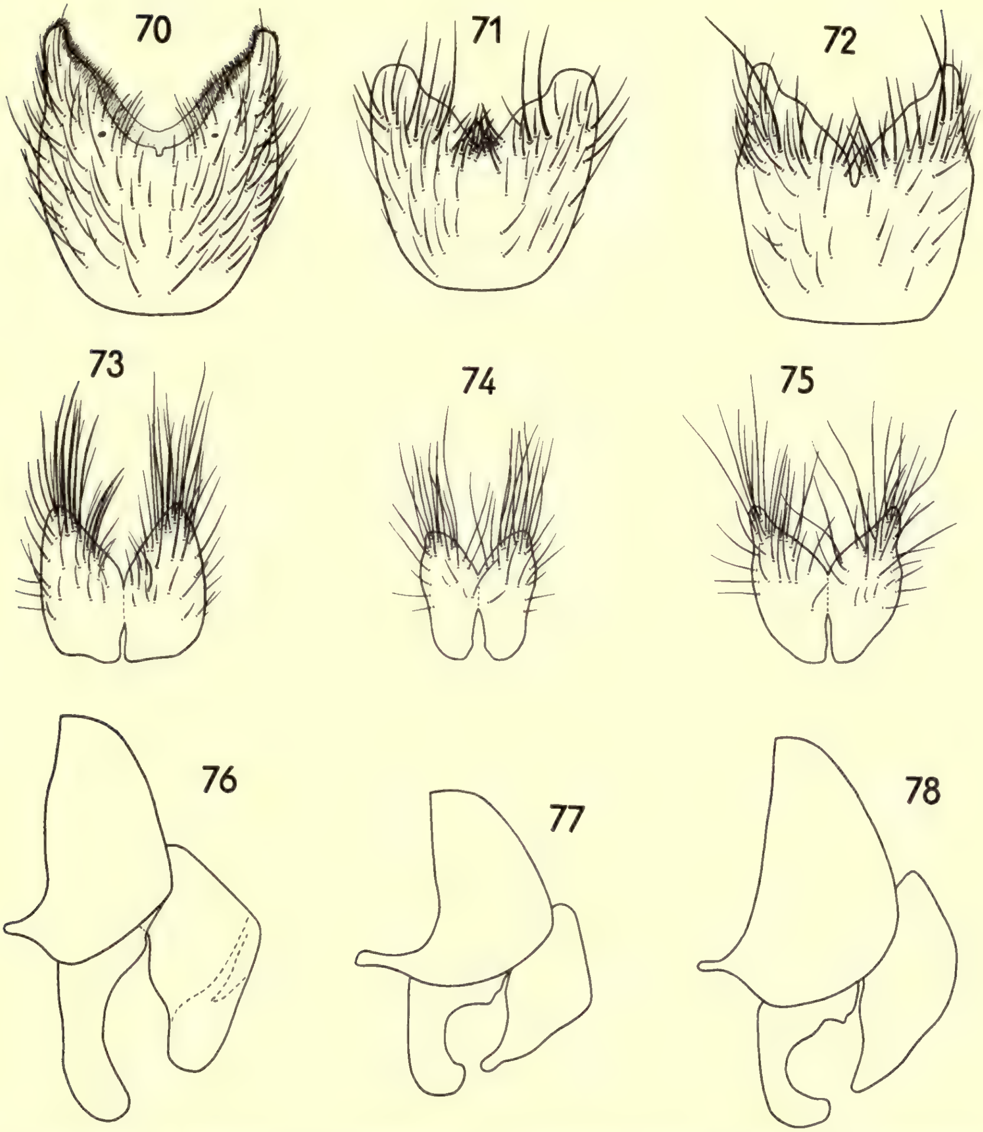
FIGS. 43–51. ♂ genitalia of *Dichaetomyia*. 43–45, 5th sternites, of: 43, *D. longiseta* Pont (Q, Gundamain, 23.viii.1925); 44, *D. significans* (Walker) (PAPUA, Brown River, 7.v.1965); 45, *D. norrisi* Pont (Q, Moggill Farm, 27.i–1.ii.1961). 46–48, Cercal plates, of: 46, *D. longiseta*; 47, *D. significans*; 48, *D. norrisi*. 49–51, hypopygia, lateral view (setae omitted), of: 49, *D. longiseta*; 50, *D. significans*; 51, *D. norrisi*.



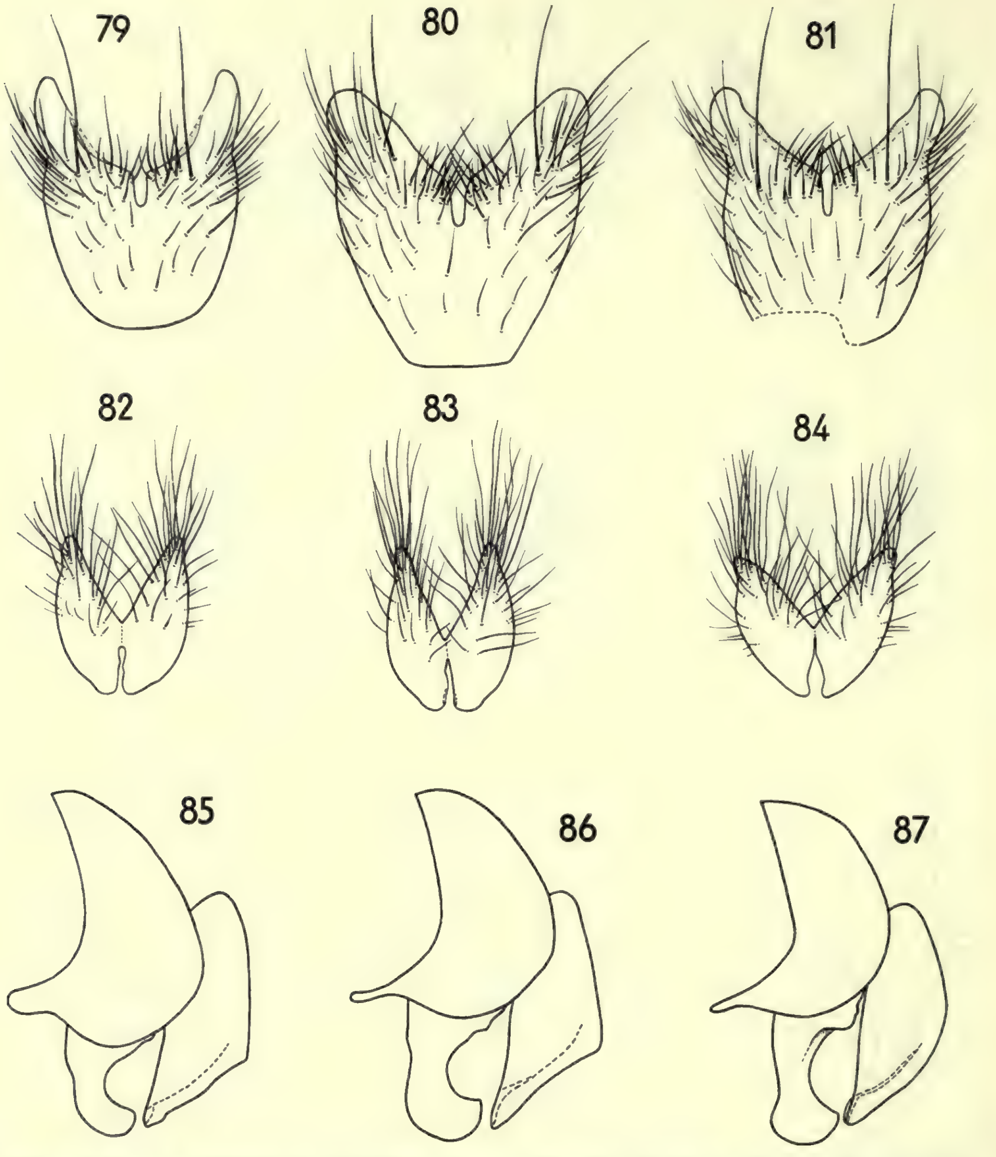
FIGS. 52–60. ♂ genitalia of *Dichaetomyia*. 52–54, 5th sternites, of: 52, *D. parimpar* sp. n. (N.S.W., Clyde Mt., 5.iv.1960, paratype); 53, *D. breviseta* sp. n. (Q, Yeppoon, 10.v.1955, paratype); 54, *D. parviseta* sp. n. (Ugi, 6.v.1934, paratype). 55–57, cercal plates, of: 55, *D. parimpar*; 56, *D. breviseta*; 57, *D. parviseta*. 58–60, hypopygia, lateral view (setae omitted), of: 58, *D. parimpar*; 59, *D. breviseta*; 60, *D. parviseta*.



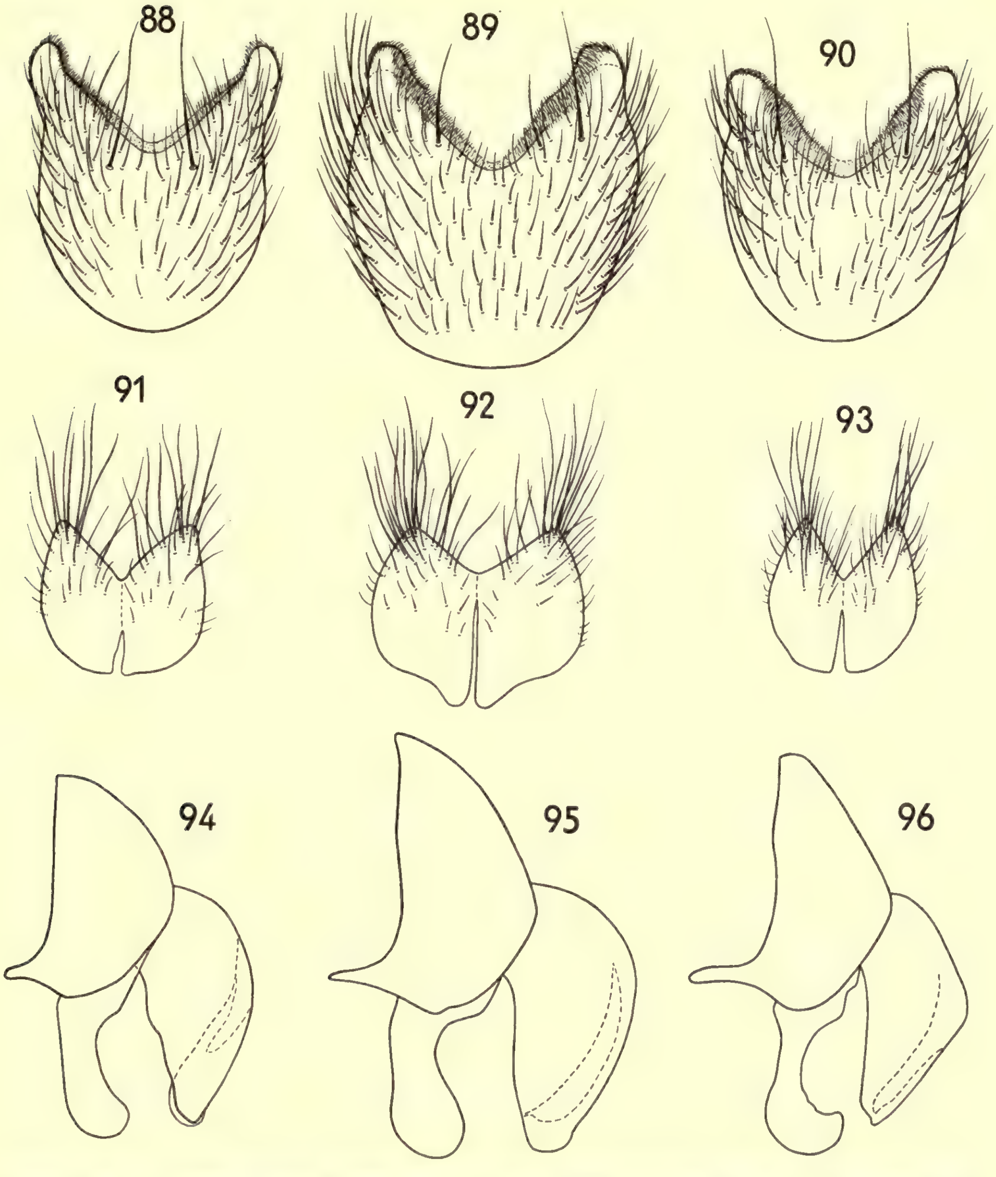
Figs. 61–69. ♂ genitalia of *Dichaetomyia*. 61–63, 5th sternites, of: 61, *D. johannis* Pont (Q, Cairns, ex corn); 62, *D. terraereginae* Malloch (Q, *Bancroft*, paratype); 63, *D. rufaeformis* sp. n. (Q, Byfield, 10.v.1955, paratype). 64–66, cercal plates, of: 64, *D. johannis*; 65, *D. terraereginae*; 66, *D. rufaeformis*. 67–69, hypopygia, lateral view (setae omitted), of: 67, *D. johannis*; 68, *D. terraereginae*; 69, *D. rufaeformis*.



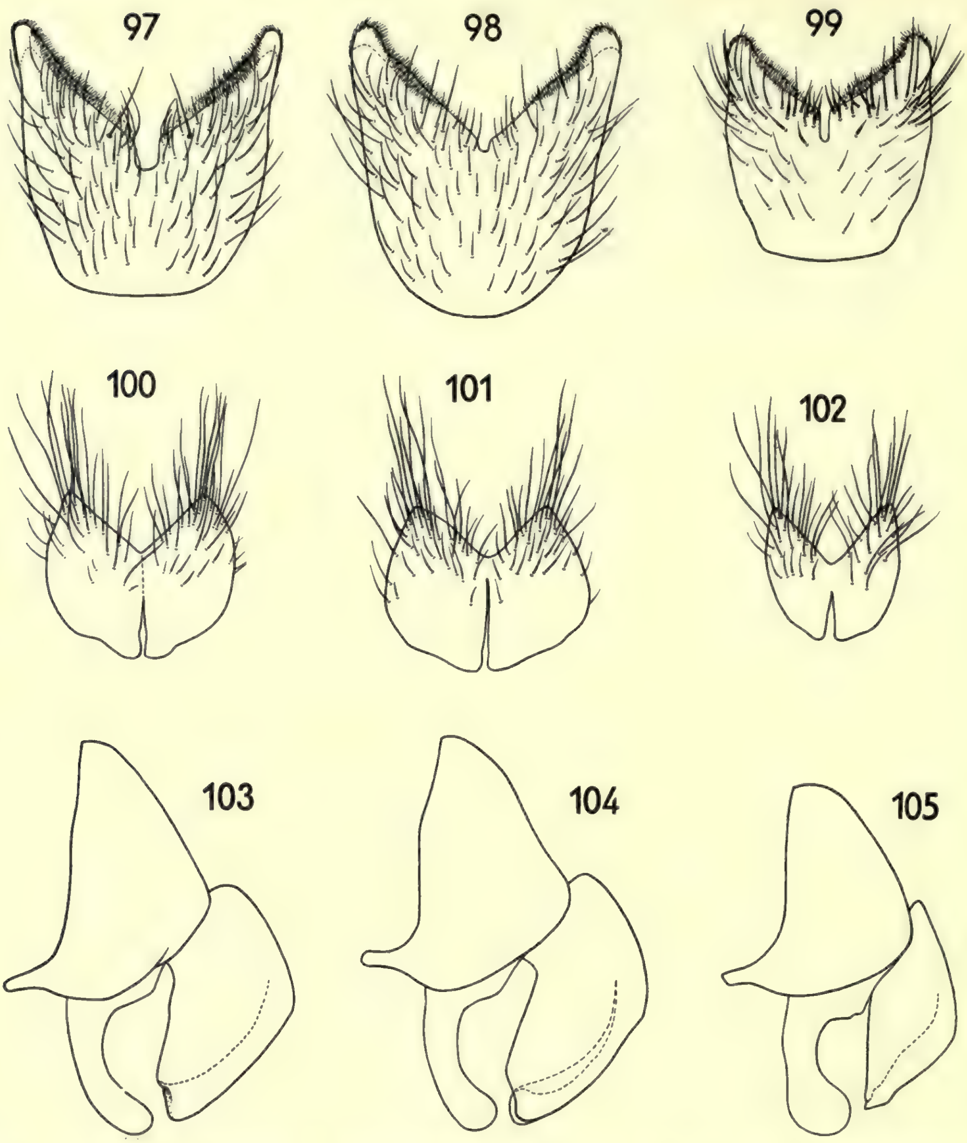
FIGS. 70–78. ♂ genitalia of *Dichaetomyia*. 70–72, 5th sternites, of: 70, *D. collessi* sp. n. (Q, Mossman Gorge, 23.iv.1967, paratype); 71, *D. australis* sp. n. (Q, Bamaga, 28.iii.1964, paratype); 72, *D. vicaria* (Walker) (Q, 14 mls S.W. of Sarina, 8.v.1955). 73–75, cercal plates, of: 73, *D. collessi*; 74, *D. australis*; 75, *D. vicaria*. 76–78, hypopygia, lateral view (setae omitted), of: 76, *D. collessi*; 77, *D. australis*; 78, *D. vicaria*.



FIGS. 79–87. ♂ genitalia of *Dichaetomyia*. 79–81, 5th sternites, of: 79, *D. flavohirta* Malloch (Q, Cairns, ex corn); 80, *D. reversa* (Walker) (Torres Strait, Thursday Is.); 81, *D. fulvohirta* sp. n. (holotype). 82–84, cercal plates, of: 82, *D. flavohirta*; 83, *D. reversa*; 84, *D. fulvohirta*. 85–87, hypopygia, lateral view (setae omitted), of: 85, *D. flavohirta*; 86, *D. reversa*; 87, *D. fulvohirta*.



FIGS. 88–96. ♂ genitalia of *Dichaetomyia*. 88–90, 5th sternites, of: 88, *D. aseta* sp. n. (Q, Kuranda Range State Forest, 20.iv.1967, paratype); 89, *D. spinuligera* sp. n. (Q, Bamboo Ck, 25.iv.1967, paratype); 90, *D. fusconota* sp. n. (Q, Kuranda, ix.1910, paratype). 91–93, cercal plates, of: 91, *D. aseta*; 92, *D. spinuligera*; 93, *D. fusconota*. 94–96, hypopygia, lateral view (setae omitted), of: 94, *D. aseta* (Q, Brunetti Coll., paratype); 95, *D. spinuligera*; 96, *D. fusconota*.



FIGS. 97–105. ♂ genitalia of *Dichaetomyia*. 97–99, 5th sternites, of: 97, *D. apicalis* (Stein) (Assam, Ganbati, 21.x.1920); 98, *D. arrogans* sp. n. (Q, Upper Mulgrave R., 9.v.1967, paratype); 99, *D. soror* sp. n. (Q, Earl Hill, 8.v.1967, paratype). 100–102, cercal plates, of: 100, *D. apicalis*; 101, *D. arrogans*; 102, *D. soror*. 103–105, hypopygia, lateral view (setae omitted), of: 103, *D. apicalis* 104, *D. arrogans*; 105, *D. soror*.

BRITISH MUSEUM
10 JUN 1969
NATURAL HISTORY

# A LIST OF SUPPLEMENTS TO THE ENTOMOLOGICAL SERIES OF THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

1. Masner, L. The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Pp. 143. February, 1965. £5.
2. Nixon, G. E. J. A reclassification of the tribe Microgasterini (Hymenoptera : Braconidae). Pp. 284 ; 348 Text-figures. August, 1965. £6.
3. Watson, A. A revision of the Ethiopian Drepanidae (Lepidoptera). Pp. 177 ; 18 plates, 270 Text-figures. August, 1965. £4 4*s*.
4. Sands, W. A. A revision of the Termite Subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. Pp. 172 ; 500 Text-figures. October, 1965. £3 5*s*.
5. Ahmad, I. The Leptocorisinae (Heteroptera : Alydidae) of the World. Pp. 156 ; 475 Text-figures. November, 1965. £2 15*s*.
6. Okada, T. Diptera from Nepal. Cryptochaetidae, Diastatidae & Drosophilidae. Pp. 129 ; 328 Text-figures. £3.
7. Giliomee, J. H. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera : Coccoidea). Pp. 168 ; 43 Text-figures. February, 1967. £3 3*s*.
8. Fletcher, D. S. A revision of the Ethiopian species and a check list of the world species of *Cleora* (Lepidoptera : Geometridae). Pp. 119; 14 plates, 146 Text-figures, 9 maps. February, 1967. £3 10*s*.
9. Hemming, A. F. The Generic Names of the Butterflies and their type-species (Lepidoptera : Rhopalocera). Pp. 509. August, 1967. £8 10*s*.
10. Stempffer, H. The Genera of the African Lycaenidae (Lepidoptera : Rhopalocera). Pp. 322; 233 Text-figures. Coloured frontispiece. September, 1967. £8.
11. Mound, L. A. A review of R. S. Bagnall's Thysanoptera Collections. Pp. 184: 82 Text-figures. May, 1968. £4.
12. Watson, A. The Taxonomy of the Drepaninae represented in China, with an Account of their World Distribution (Lepidoptera : Drepanidae). Pp. 151: 293 Text-figures, 14 plates. November, 1968. £5.
13. Afifi, S. A. Morphology and Taxonomy of the Adult Males of the Families Pseudococcidae and Eriococcidae (Homoptera : Coccoidea). Pp. 210: 52 Text-figures. December, 1968. £5.

PRINTED IN GREAT BRITAIN BY ADLARD & SON LIMITED, BARTHOLOMEW PRESS, DORKING

m i E

# A LIST OF THE TYPE-SPECIMENS OF ODONATA IN THE BRITISH MUSEUM (NATURAL HISTORY)

## PART II

D. E. KIMMINS

BRITISH MUSEUM
10 JUN 1969
NATURAL HISTORY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 7
LONDON : 1969

# A LIST OF THE TYPE-SPECIMENS OF ODONATA IN THE BRITISH MUSEUM (NATURAL HISTORY)
## PART II

BY
DOUGLAS ERIC KIMMINS
British Museum (Natural History)

BRITISH MUSEUM
10 JUN 1969
NATURAL HISTORY

*Pp.* 287–314

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 7
LONDON : 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In* 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Vol.* 23, *No.* 7 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

*World List* abbreviation:
*Bull. Br. Mus. nat. Hist.* (Ent.).

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued* 13 *May*, 1969 *Price Thirteen Shillings*

# A LIST OF THE TYPE-SPECIMENS OF ODONATA IN THE BRITISH MUSEUM (NATURAL HISTORY)
## PART II

Families Gomphidae, Cordulegasteridae, Petaluridae, Aeshnidae, Calopterygidae, Euphaeidae, Amphipterygidae & Chlorocyphidae.

*By* D. E. KIMMINS

## CONTENTS

Page
GOMPHIDAE . . . . . . . . . . . . . 290
CORDULEGASTERIDAE . . . . . . . . . . 299
PETALURIDAE . . . . . . . . . . . . 300
AESHNIDAE . . . . . . . . . . . . . 300
CALOPTERYGIDAE . . . . . . . . . . . 304
EUPHAEIDAE . . . . . . . . . . . . 306
AMPHIPTERYGIDAE . . . . . . . . . . 307
CHLOROCYPHIDAE . . . . . . . . . . . 308
REFERENCES . . . . . . . . . . . . 310

## SYNOPSIS

A list of the type-specimens of Odonata in the British Museum (Natural History), belonging to the eight above-mentioned families has been prepared. Three hundred and seventy-eight taxa are dealt with and lectotypes are designated for 74 of these taxa.

## INTRODUCTION

THIS list is a continuation of that published in 1968, *Bull. Brit. Mus. nat. Hist.* (Ent.) **22** (7) : 277–305, and follows the same general plan. The first part dealt with the families Libellulidae and Corduliidae. For convenience of working, a separate list of references is being given for the taxa in each part. The family names used in the Calopterygoidea are those given by Montgomery (1967, *Dt. ent. Z.*, N. F. **14** : 327–337). In the present paper, where the original author has specified 'Type ♂' (or 'Type ♀') I have accepted this as equivalent to Holotype, although this term may not have been current at that time.

This list was completed August 1968.

## ERRATA (Kimmins, 1968)

Dr. E. Pinhey has drawn my attention to the following two errata in the above paper.

p. 286. Under *fraseri* Pinhey (*Olpogastra*). The author of the genus *Zygonoides* should be Fraser.

p. 290. *nigra* Longfield. Through a most unfortunate oversight, I have overlooked the fact that Miss Longfield did specify two examples in the type-series and that the complete male was specified as the holotype. This entry should therefore read:—

***nigra*** Longfield (ssp. of ***Trithemis donaldsoni***), 1936 : 491–493, 496, figs. 9, 10. Holotype ♂. W. Africa, Principe I., Ogui Pipi, 1.i.1932, *W. H. T. Tams* / Trithemis donaldsoni nigra ssp. nov. Type ♂, det. Miss C. Longfield.

## GOMPHIDAE

***abdominalis*** McLachlan (***Gomphus***), 1884 : viii. Holotype ♂. Type [McL. label] / North China [interior] / Gomphus abdominalis McL.
Currently placed as *Gastrogomphus*, of which it is the type-species.

***aberrans*** Selys (?***Hagenius***), 1873 : 506. Holotype ♀. India (*Lang*) / Hagenius? aberrans Selys ♀.
Currently placed in the genus *Davidius*.

***abyssinicus*** Selys (***Onychogomphus***), 1878 : 426. LECTOTYPE ♀. Abyssinia / Onychogomphus Abyssinicus Selys ♀ / Onychogomphus abyssinicus Selys, Lectotype ♀, D. E. Kimmins det. 1959.
Currently placed in *Crenigomphus*.

***acutus*** Laidlaw (***Ictinus***), 1914 : 51–52, pl. 1, fig. 1. Holotype ♂. Borneo, Sarawak, Baram, 18.x.1910 (*J. C. Moulton*) / Baram, 18.x.[19]10 / Ictinus acutus type [Laidlaw's writing].
Laidlaw states 'The type is in the British Museum [Nat. Hist.]; co-type, Sarawak Museum.'

***aethiops*** Selys (***Phyllogomphus***), 1854 : 43. Holotype ♂. [Côte de Guinée] / Riv. Gambia / Phyllog. aethiops de Selys.
The 'Côte de Guinée' label is now missing. In the original description the specific name is misspelt 'aetiops'. The holotype is very discoloured and lacks apex of the right fore wing.

***africanus*** Fraser (***Echinopterogomphus***), 1926. Kimmins, 1966 : 177.

***ambigua*** Selys (***Gomphoides***), 1873 : 505. Holotype ♀. Guatemala / Gomphoides De Selys / Gomphoides [Selys writing] ambigua De Selys [WFK].
Currently placed in the genus *Negomphoides*.

***amphiclitus*** Selys (***Austrogomphus***), 1873 : 757. Holotype ♂. Type [McL. label] / Queensland / Hemig. amphiclytus de Selys ♂ / Austrogomphus (Selys 1878) amphictilus [*sic*] S. [Selys labels].
Currently placed in *Austroepigomphus*.

***angeli*** Tillyard (***Austrogomphus***), 1913*a* : 233–235, pl. 15, figs. 3–7. LECTOTYPE ♂. S. Australia, Murray R[iver], Morgan, 28.xii.[19]09 (*S. Angel*) / Austrogomphus angeli Tillyd. ♂ TYPE R.J.T. / Austrogomphus angeli Till., ♂ Lectotype, D. E. Kimmins det. 1968.
Of 5 ♂, 6 ♀, syntypes listed by Tillyard, only the ♂ ♀ Types are in BM(NH); the dates of these agree with those given by Tillyard.

***angulosus*** Selys (***Ictinus***), 1854 : 92. Holotype ♂. India [replacement for missing label] / Ictinus angulosus de Selys / Ictinus angulosus De Selys ♂.
Currently placed in *Ictinogomphus*.

***angustipennis*** Selys (***Diaphlebia***), 1854 : 81. LECTOTYPE ♂. Para / Gomph. angustipennis de Selys / Diaphlebia angustipennis Selys, ♂ Lectotype, D. E. Kimmins det. 1968.
This specimen was incorrectly labelled holotype, since Selys had more than one example. The BM(NH) also has the allotype and 1 paralectotype.

***annaimallaicus*** Fraser (race of ***Lamelligomphus nilgiriensis***), 1934. Kimmins, 1966 : 171.

***annularis*** Selys (***Onychogomphus***), 1894 : 167. LECTOTYPE ♂ (incomplete). North Birmah / Onychogomphus annularis n. sp. ♂, North Birmah, Type.
The second of the syntypes has not been traced in the McLachlan collection. The last four segments of the abdomen of the lectotype were missing at the time of description.

***annulatus*** Selys (***Heterogomphus***), 1854 : 28. Holotype ♀. [Indes Collect. Saunders] / Heterogomphus annulatus de Selys.

The locality label was missing and has been replaced. Currently placed in the genus *Macrogomphus*. Fraser (1934 : 344) gives the locality as probably India.

***appendiculatus*** Kirby (***Gomphoides***), 1899 : 368–369, pl. 15, fig. 3. Holotype ♂. La Chorrera, Panama / Gomphoides appendiculatus Kb. *type* [WFK].

Currently placed in the genus *Negomphoides*.

***aquicola*** Fraser (***Agriogomphus***), 1943. Kimmins, 1966 : 179.

***arbustorum*** Tillyard (***Austrogomphus***), 1906 : 547–549, pl. 34, fig. 1. LECTOTYPE ♂. [N. Queensland] Kuranda, xii.[19]04 / Austrogomphus arbustorum Till. ♂ TYPE. R.J.T. / Austrogomphus arbustorum Till., ♂ Lectotype, D. E. Kimmins det. 1968.

***arenarius*** Tillyard (***Austrogomphus***), 1906 : 549–551, pl. 34, fig. 2. LECTOTYPE ♂. [N. Queensland] Kuranda, xii.[19]04 / Austrogomphus arenarius Till. ♂ TYPE, R.J.T. / Austrogomphus arenarius Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Antipodogomphus proselytus* (Selys). In the lectotype, the upper part of the superior appendages has been broken.

***armatus*** Selys (***Dromogomphus***), 1854 : 59. Holotype ♂. ?N. America [replacement for missing label] / Dromog. armatus de Selys / Dr. armatus DeSelys.

***armiger*** Tillyard (***Austrogomphus***), 1919 : 577–578, pl. 62, figs. 6–8. LECTOTYPE ♂. W. A[ustralia], Waroona, 7.xi.[19]11 (*G. F. Berthoud*) / Austrogomphus armiger Till., ♂ TYPE, R.J.T. / Austrogomphus armiger Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Hemigomphus*.

***auricolor*** Fraser (***Gomphus***), 1926. Kimmins, 1966 : 181.

***australis*** Selys (***Ictinus***), 1873 : 769–771. LECTOTYPE ♂. Type [McL. label] / Queensland / Ictinus australis de Selys ♂ [Selys' writing] / Ictinus australis Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as *Ictinogomphus*.

***bicornutus*** Fraser (***Gomphus***), 1922. Kimmins, 1966 : 182.

***bidens*** Selys (***Neogomphus***), 1878 : 470. Holotype ♂. Valparaiso, El Salto (*Mathews*) / Neogomphus bidentatus [*sic*] H. ♂ El Salto / Neogomphus bidens Selys, ♂ Holotype, D. E. Kimmins det. 1968.

***bidentatus*** Fraser (***Leptogomphus***), 1930. Kimmins, 1966 : 182.

***bifurcatus*** Tillyard (***Austrogomphus***), 1909 : 244, 245, pl. 22, figs. 2, 9, pl. 23, figs. 9, 10. LECTOTYPE ♂. [N. Queensland], Atherton, iv.[19]07 / Austrogomphus bifurcatus Till., ♂ TYPE, R.J.T. / Austrogomphus bifurcatus Till., ♂ Lectotype, D. E. Kimmins det. 1968.

***bison*** McLachlan (***Ophiogomphus***), 1873 : 496. Holotype ♀ (lacking abd. segs. 5–10). N. California (*Walsingham*) / Ophiogomphus bison Selys ♀.

***bodkini*** Campion (***Zonophora***), 1920 : 136–138, pl. 7, figs. 10–14. Holotype ♀. British Guiana, Tumatumari R., Potaro, xii.1918 (*G. E. Bodkin* / Labium, hypopharynx, maxillae and ova mounted on separate slides / Zonophora bodkini Campion, Holotype, Determined by H. Campion.

Currently placed as a synonym of *Zonophora batesi* Selys.

***borealis*** McLachlan, *in* Selys (***Progomphus***), 1873 : 764. Holotype ♂. Type [McL. label] / N. California (*Walsingham*) / Prog. borealis ♂ [Selys' writing] / Progomphus borealis Selys ♂. Holotype, in spite of difference in locality, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Gomphoides obscurus* (Rambur).

The holotype is labelled as above, although Selys gives 'Oregon' as the locality. One cannot say whether Selys or McLachlan is responsible for the error. The species has been recorded for both states.

***borneensis*** Laidlaw (ssp. ***Heterogomphus icterops*** Martin), 1914 : 57–58, pl. 1, fig. 3. Holotype ♂. [Borneo, Matang Rd., 28.iii.1910] Sarawak Mus. (*J. C. Moulton*) / Heterogomphus icterops borneensis ♂ Type [Laidlaw's label].

Currently placed as a synonym of *Megalogomphus icterops* (Martin).

***borikhanensis*** Fraser (***Macrogomphus***), 1933. Kimmins, 1966 : 183.

***brevipes*** Selys (***Aphylla***), 1854 : 78. Lectotype ♂ (designated by Belle, in press, 1968). Para / 35 / brevipes De Selys ♂ / Aphylla brevipes S. Lectotype. Rev. J. Belle, 1967.

***burmicus*** Fraser (***Microgomphus***), 1925. Kimmins, 1966 : 184.

***butoloensis*** Fraser (***Notogomphus***), 1952. Kimmins, 1966 : 184.

***cacharicus*** Fraser (***Lamellogomphus***), 1924. Kimmins, 1966 : 184.

***calverti*** Kirby (***Cyclophylla***), 1897 : 613–614. Holotype ♂. Lower Amazon, Parana de Buyassu, 15.i.[18]96 (*E. E. Austen*) / W. end of Parana de Buyassu, 15.i.[18]96 / calverti Kb. [WFK].

Currently placed in *Phyllocycla*. In the original description, the specific name was printed '*Calverti*'. The penis was removed and mounted in canada balsam by H. Campion.

***camelus*** Calvert (***Epigomphus***), 1905 : 170, 172, pl. 8, figs. 1–3. Holotype ♂. Costa Rica, Carillo (*Underwood*) / Epigomphus camelus Calv. P. P. Calvert det., 1905. B.C.A. Neur., p. 175. TYPE, Original of pl. viii, figs. 1–3.

The abdomen is now fragmented and glued on a card.

***camerunensis*** Longfield (***Microgomphus***), 1951 : 98–100, figs. 1A–F. Holotype ♀. British Cameroons, Kumba, Police Stn. stream, 23.v.1950 (*F. O'Rourke*) / Microgomphus camerunensis sp. nov. Holotype ♂, det. Miss C. Longfield.

***campioni*** Fraser (***Orogomphus***), 1924. Kimmins, 1966 : 185.

***carpenteri*** Fraser (***Nilogomphus***), 1928. Kimmins, 1966 : 185.

***caudalis*** Fraser (***Anisogomphus***), 1926. Kimmins, 1966 : 186.

***cauvericus*** Fraser (***Burmagomphus***), 1926. Kimmins, 1966 : 186.

***cervus*** Fraser (***Heliogomphus***), 1942. Kimmins, 1966 : 186.

***ceylonicus*** Laidlaw (***Heterogomphus***), 1922 : 412–413, fig. 21. Holotype ♂. Ceylon (*Yerbury*) / Huldamulla, 10.vi.[18]92 / Heterogomphus ceylonicus Laidlaw, ♂ Holotype, det. D. E. Kimmins.

Currently placed in the genus *Megalogomphus*.

***chichibui*** Fraser (***Gomphus***), 1936. Kimmins, 1966 : 186.

***circularis*** Selys (?***Onychogomphus***), 1894 : 165. Lectotype ♂ (by designation of Fraser, 1934 : 263). North Birmah / yellow label / Onychogomphus circularis ♂ Selys n. sp. Type.

Fraser's designation is 'One pair in the McLachlan collection, from Upper Burma, the male being the *type*.'

***coloratus*** Kimmins (***Phyllogomphus***), 1931 : 217–219, figs. A–C. Holotype ♂. West Africa: Fernando Po, 650 ft., End of Wet Season (*W. Cooper*) / Phyllogomphus coloratus Kimmins, Type ♂, det. D. E. Kimmins, 1930.

***comitatus*** Tillyard (***Austrogomphus***), 1909 : 245–248, pl. 22, figs. 3, 10, pl. 23, figs. 1, 2. LECTOTYPE ♂. N. Q[ueensland], Cooktown, i.[19]08 (*R. J. Tillyard*) / Austrogomphus comitatus Till., ♂ TYPE, R.J.T. / Austrogomphus comitatus Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Hemigomphus gouldi* (Selys).

***confraternus*** Selys (***Gomphus***), 1873 : 744. LECTOTYPE ♂. California (*Edwards*) / Gomphus confraternus de Selys, ♂ / Gomphus confraternus Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

The female allotype is labelled 'N. California, Walsingham', not 'California, Edwards' as stated by Selys.

**cornutus** Pinhey (**Crenigomphus**), 1956 : 83–84, fig. 1. Holotype ♂. Rhodesia, Vict[oria] Falls, i.1956 [(*E. Pinhey*)], Nat. Mus. S. Rhodesia / TYPE ♂, Crenigomphus cornutus Pinh. 1956.

**cyaneofrons** Fraser (**Gomphus**), 1923. Kimmins, 1966 : 187.

**delineatus** Fraser (ssp. **Davidius zallorensis**). Kimmins, 1966 : 188.

**demerarae** Selys (?**Cyanogomphus**), 1894 : 173. Holotype ♀. Demerara / Cyanogomphus? demerarae n. sp. ♂ [Selys' writing] Type [McL. writing].

Abdominal segments 6–10 lacking. Currently placed in *Ebegomphus*.

**diadophis** Calvert (**Erpetogomphus**), 1905 : 167, pl. 7, figs. 35, 47. Holotype ♂. [United States], Texas / Erpetogomphus diadophis Calv. TYPE. P. P. Calvert det. 1905. B. C. A. Neur., p. 167. Original of pl. vii, figs. 35, 47.

[**diminutivus** Fraser (**Onychogomphus**), 1924. Not traced in Fraser collection. Kimmins, 1966 : 189].

**dingavani** Fraser (**Onychogomphus**), 1924. Kimmins, 1966 : 189.

**doddi** Tillyard (**Austrogomphus**), 1909 : 249–251, pl. 22, fig. 5, pl. 23, fig. 5. Holotype ♂. N. Q[ueensland], Kuranda, xi.[19]06 (*F. P. Dodd*) / Austrogomphus Doddi Till., ♂ TYPE, R.J.T.

**drummondi** Fraser (**Lamellogomphus**), 1924. Kimmins, 1966 : 190.

**duarensis** Fraser (**Burmagomphus**), 1922. Kimmins, 1966 : 190.

**duaricus** Fraser (**Onychogomphus**), 1924. Kimmins, 1966 : 190.

**dundomajoricus** Fraser (**Phyllogomphus**), 1957. Kimmins, 1966 : 190.

**dundominusculus** Fraser (**Phyllogomphus**), 1957. Kimmins, 1966, 190.

**echinoccipitalis** Fraser (**Onychogomphus**), 1922. Kimmins, 1966 : 190.

**elongatus** Selys (**Gomphus**), 1854 : 58. Holotype ♀. North America [replacement for missing label] / Gomphus elongatus de Selys / Gomph. elongatus De Selys ♀.

Currently placed as synonym of *Gomphus notatus* Rambur.

**epophthalmus** Selys (**Gomphus**), 1872 : 31. LECTOTYPE ♂. [Irkutsk], Sibir. orient. (*Maa*[*c*]*k*) / Type [McL. label] / Gomphus epophthalmus Selys / Gomphus epophthalmus Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

**eutainia** Calvert (**Erpetogomphus**), 1905 : 162, pl. 7, figs. 24–27, 39. Holotype ♂. [Mexico], Guerrero, R. Papagaio, x. (*H. H. Smith*) / Erpetogomphus eutainia Calvert, P. P. Calvert det. 1905 / B.C.A. Neur., p. 162, Original of pl. 7, figs. 24–27, 39.

**exilis** Selys (**Gomphus**), 1854 : 55. Holotype ♂. 'R' on small diamond of blue paper / Gomphus exilis de Selys / Gomph. exilis de Selys / Gomph. exilis De Selys ♂.

**femoralis** Laidlaw (**Merogomphus**), 1931 : 210. Holotype ♂. F. M. S., Selangor, Kuala Lumpur, 6.vi.1921 (*H. M. Pendlebury*) / Merogomphus femoralis ♂, n. sp. Type [Laidlaw's writing].

**flavicolor** Fraser (**Heterogomphus**), 1923. Kimmins, 1966 : 192.

**flavifrons** Fraser (**Notogomphus**), 1952. Kimmins, 1966 : 192.

**flavifrons** Selys (**Onychogomphus**), 1894 : 164. Holotype ♀ (teneral). Madagascar, Fianárantsoa / Onychogomphus flavifrons Selys n. sp. (aequistyla?) ♀ Type.

The word 'Type' on the determination label is in McLachlan's writing.

**fletcheri** Fraser (**Gomphidia**), 1923. Kimmins, 1966 : 192.

**fraseri** Kimmins (**Ictinogomphus**), 1958 : 354–357, figs. 4a–c, 5a–b, 6a. Holotype ♂. W. Africa, Sierra Leone, Port Lokko, 3.v.1912 (*J. J. Simpson*) / Ictinogomphus fraseri Kim., ♂ Type, D. E. Kimmins det. 1958.

***frontalis*** Selys (***Onychogomphus***), 1878 : 428–429. Holotype ♀. Tennasserim / Moolai to Morlat, 4–5,000 / Onychogomphus frontalis Selys ♀ Moolai.
Currently placed in *Paragomphus*.

***fujiacus*** Fraser (***Gomphus***), 1936. Kimmins, 1966 : 193.

***fujiama*** Fraser (***Davidius***), 1936. Kimmins, 1966 : 193.

***gynostylus*** Fraser (***Cyclogomphus***), 1926. Kimmins, 1966 : 194.

***hannyngtoni*** Fraser (***Heterogomphus***), 1923. Kimmins, 1966 : 194.

***hasimaricus*** Fraser (***Burmagomphus***), 1926. Kimmins, 1966 : 195.

***henryi*** Laidlaw (***Mesogomphus***), 1928 : 131. Holotype ♂. Ceylon, Urugalla, 3,000 ft., 16.iv.1924, with on reverse (*G. M. Henry*) / Mesogomphus henryi n. sp. Laidlaw (MSS) holotype ♂.
Currently placed in the genus *Paragomphus*. The locality label incorrectly gave the collector's name as F. F. Laidlaw.

***heterostylus*** Selys (***Cyclogomphus***), 1854 : 62. Holotype ♂. North Ind[ia] / Gomphus heterostyla ♂ De Selys [with on reverse, Gomphus globifer de Selys] / Cyclog. heterostylus de Selys.

***immisericors*** Campion (***Notogomphus***), 1923 : 667–669. Holotype ♀. Brit. E. Africa, Nandi Plateau, 5,700–6,200 ft., 4.vi.1911 (*S. A. Neave*) / 'A' preying on 'A1' / Notogomphus rueppeli Selys forma ♀, Table 1, no. 19 / Notogomphus immisericors Campion ♀ Holotype.

***inclitus*** Selys (***Leptogomphus***), 1878 : 444. Lectotype ♀ (Fraser, 1934 : 365). Type [McL. label] / Tenasserim / Moolai 3–6,000 / Leptogomphus inclitus S., ♀, Moolai / Leptogomphus inclitus Selys, ♀ Lectotype, F. C. Fraser, 1934.
I am accepting Fraser's statement 'The *type* (in the McLachlan collection) from Moolai, Lower Burma . . .' as equivalent to a designation of lectotype.

***inglisi*** Fraser (***Lamellogomphus***), 1924. Kimmins, 1966 : 197.

***inglisi*** Fraser (***Stylogomphus***), 1922. Kimmins, 1966 : 198.

***insularis*** Laidlaw (ssp. *Burmagomphus vermicularis*), 1914 : 55–57, pl. 1, fig. 2. Holotype ♂. Sarawak, Borneo (*J. C. Moulton*) / Burmagomphus vermiculatus Martin / subsp. n. insularis Type / [last two labels in Laidlaw's writing].
Currently treated as a distinct species. The ninth and tenth segments, with appendages, have been softened and preserved in glycerine.

***kalarensis*** Fraser (***Heliogomphus***), 1934. Kimmins, 1966 : 198.

***kerri*** Fraser (***Macrogomphus***), 1932. Kimmins, 1966 : 199.

***kerri*** Fraser (***Onychogomphus***), 1933. Kimmins, 1966 : 199.

***kimminsi*** Belle (***Gomphoides***), [in press]. Holotype ♂. Tuc[uman], Dep. Famailla, Fronterita, 28.xi.1942 (*Ares*) / Gomphoides gracilis Selys [F. C. Fraser det.] / Gomphoides kimminsi sp. n. Holotype. Det. J. Belle, 1968.

***kodaguensis*** Fraser (***Gomphidia***), 1923. Kimmins, 1966 : 199.

***kumaonensis*** Fraser (***Davidius***), 1926. Kimmins, 1966 : 199.

***laidlawi*** Fraser (***Burmagomphus***), 1924. Kimmins, 1966 : 200.

***lateralis*** Selys (***Hemigomphus***), 1873 : 501. Holotype ♀ (abdomen missing). N. Aust[ralia] / Hemigomphus? [Selys' writing] lateralis De Selys (type) [WFK writing].
Currently placed in *Austrogomphus*.

***lecythus*** Campion (***Notogomphus***), 1923 : 664–667, figs. 3, 4. Holotype ♂. Abyssinia, [Lake] Tsana, Zegi, v–vi 1902 (*Degen*) / Notogomphus lecythus Campion ♂ Holotype. Determined by H. Campion.

***lieftincki*** Fraser (***Heliogomphus***), 1942. Kimmins, 1966 : 201.

**lilliputians** Fraser (**Microgomphus**), 1923. Kimmins, 1966 : 201.

**lindgreni** Fraser [**Onychogomphus**), 1923. Kimmins, 1966 : 201.

**lividus** Selys (**Gomphus**), 1854 : 53. Holotype ♀. United States [replacement for missing label] / Gomphus lividus de Selys / Gomphus lividus De Selys ♂.

**longistigma** Fraser (**Indogomphus**), 1922. Kimmins, 1966 : 202.

**longus** Martin (ssp. **Notogomphus rueppeli**), 1915 : 36, pl. 2, fig. 6; Campion, 1923 : 660. Holotype ♀. Uganda, Nairobi Plains, 5,400 ft., 16.v.1900 (*R. Crawshay*) / B. E. Africa, R. Crawshay / Notogomphus Rüppeli Selys, forme longus Martin nova subspecies, Type.

**loogali** Fraser (**Microgomphus**), 1923. Kimmins, 1966 : 202.

**maacki** Selys (**Gomphus**), 1872 : 15. Holotype ♂. Type [McL. label] / Sibir. orient., [Irkutsk] (*Maa*[*c*]*k*) / Gomphus maaki [*sic*] Selys ♂.

Currently placed in the genus *Anisogomphus*. The specific name is correctly spelt in the original description.

**maclachlani** Selys (**Gomphidia**), 1873 : 767. LECTOTYPE ♂. Type [McL. label] / Labuan / 300 [blue label] / Gomphidia McLachlani de Selys ♂ / Gomphidia maclachlani Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

**maclachlani** Selys (**Onychogomphus**), 1878 : 168. Holotype ♀. North Birmah / yellow label / Onychogomphus McLachlani Selys n. sp. ♀, N. Birmah Type.

**madi** Pinhey (**Gomphidia**), 1961 : 64–65, pl. 3, figs. 4–8. Holotype ♂. Uganda, West Nile, West Madi, Ara, vi.1954 (*T. H. E. Jackson*) / Gomphidia madi Pinh. HOLOTYPE.

**magnus** Fraser (**Paragomphus**), 1952. Kimmins, 1966 : 202.

**malabarensis** Fraser (**Lamellogomphus**), 1924. Kimmins, 1966 : 203.

**malayanus** Laidlaw (**Acrogomphus**), 1925 : 443. Holotype ♂. Pulo Aor, off E. coast of Johore, 12.vi.[18]72 (*R.H.*) / 10 / Acrogomphus malayanus (Holotype ♂) [Laidlaw's writing].

**malloryi** Fraser (**Davidius**), 1926. Kimmins, 1966 : 203.

**manifestus** Tillyard (**Austrogomphus**), 1909 : 248–249, pl. 22, figs. 4, 9. Holotype ♀. N. Q[ueensland], Kamerunga, ii.[19]09 (*E. Allen*) / Austrogomphus manifestus Till., ♀ TYPE, R.J.T.

Currently placed as synonym of *Antipodogomphus acolytus* (Selys, *in* Martin). Tillyard gives the locality of the unique type as Kuranda, N. Q., January. The above specimen, which agrees well with the description, is labelled Kamerunga, February, and I suspect that the locality given by Tillyard is an error.

**martini** Fraser (**Davidiodes**), 1924. Kimmins, 1966 : 203.

**melaleucae** Tillyard (**Austrogomphus**), 1909 : 241–244, pl. 22, figs. 1, 9, pl. 23, figs. 9, 10. LECTOTYPE ♂. New South Wales, Sydney [Auburn, Duck Creek], xi.[19]07 (*R. J. Tillyard*) / Austrogomphus melaleucae Till., ♂ TYPE, R.J.T. / Austrogomphus melaleucae Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Austroepigomphus praeruptus* (Selys).

**m-flavum** Selys (**Onychogomphus**), 1878 : 169. LECTOTYPE ♂. Darjeeling / Onychogomphus M-flavum Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Fraser (1934 : 254) restricts the type to material in the McLachlan collection and I have therefore made the above lectotype designation.

**minor** Laidlaw (**Acrogomphus**), 1931 : 215–217. LECTOTYPE ♂. F. M. S., Selangor, Kuala Lumpur, 22.vii.1922 (*H. M. Pendlebury*) / Acrogomphus minor ♂ Type [Laidlaw's writing] / Acrogomphus minor Laidlaw, ♂ Lectotype, D. E. Kimmins det. 1968.

In the original description, the account of the male is preceded by a female sign.

***minusculus*** Selys (?***Cyclogomphus***), 1878 : 468. Holotype ♀. Tenasserim / Moolai to Morlut, 4–5,000 ft. / Cyclogomphus minusculus Selys, ♀, Moolai / I believe this to be the type of *Cyclogomphus minusculus* Selys, 1878. det. Miss C. Longfield, 1950.

Currently placed in *Microgomphus*.

***moka*** Longfield (***Paragomphus***), 1936 : 478, fig. 5. Holotype ♂. Fernando Po, Moka, 28.i–3.ii.1933 (*W. H. T. Tams*) / Paragomphus moka sp. nov. Type ♂, det. Miss C. Longfield.

Currently placed as synonym of *P. abnormis* Karsch.

***montanus*** Fraser (***Phyllogomphus***), 1957. Kimmins, 1966 : 204.

***moundi*** Fraser (***Phyllogomphus***), 1960. Kimmins, 1966 : 205.

***nigrescens*** Pinhey (***Onychogomphus***), 1952. See *styx* Pinhey, 1961.

***nigricolor*** Fraser (***Hagenius***), 1924. Kimmins, 1966 : 206.

***nilgiriensis*** Fraser (ssp. of ***Onychogomphus biforceps***), 1922. Kimmins, 1966 : 206.

***nyasicus*** Kimmins (***Paragomphus***), 1955 : 111–113, fig. 3. Holotype ♂. Nyasaland, 'Ramens' [West shore of L. Nyasa, about 12 miles N. of Fort Johnston], 11.i.1947 / *R. H. Lowe & R. C. Wood* / Paragomphus nyasicus ♂ Kim., Holotype.

***obscura*** Kirby (***Cyclophylla***), 1899 : 369–370, pl. 15, fig. 4. Holotype ♂. Panama, La Chorrera / Cyclophylla obscura Kb. type [WFK writing].

***occidentalis*** Fraser (***Phyllogomphus***), 1957. Kimmins, 1966 : 207.

***occidentalis*** Tillyard (***Austrogomphus***), 1908 : 729–732, pl. 35, figs. 5–6, pl. 36, fig. 3. LECTOTYPE ♂. W. A[ustralia], Margaret R., i.[19]07 (*R. J. Tillyard*). / Austrogomphus lateralis Selys. ♂ TYPE, R.J.T. / Austrogomphus occidentalis Till. ♂, D. E. Kimmins det. 1959 / Austrogomphus occidentalis Till., ♂ Lectotype, D. E. Kimmins det. 1968.

In the Tillyard Bequest material there was no example labelled as Type ♂ of *occidentalis*. There was, however, a ♂ from the type locality, Margaret R., i.1907, labelled by Tillyard as *Austrogomphus lateralis* Selys ♂ Type (i.e., allotype), with which species Tillyard suspected his *occidentalis* to be synonymous. I have therefore designated this specimen as the lectotype of *Austrogomphus occidentalis* Till.

Currently placed as a synonym of *Austrogomphus lateralis* Selys.

***occipitalis*** Selys (***Gomphus***), 1854 : 45. LECTOTYPE ♀. [Locality label missing] / Gomphus occipitalis Selys / Gomphus occipitalis ♀ de Selys / Gomphus occipitalis Selys, ♀ Lectotype, D. E. Kimmins det. 1968.

This example has for many years carried a holotype label; this cannot be correct, as examples of both sexes were available to Selys and he did not designate a type. The 'occiput noire profondément échancré au milieu' mentioned by Selys, appears to be an artefact.

Currently placed in the genus *Anisogomphus*.

***odoneli*** Fraser (***Gomphus***), 1922. Kimmins, 1966 : 207.

***olivaceus*** Selys (***Gomphus***), 1873 : 749. Holotype ♀. N. California (*Walsingham*) / Gomphus olivaceus de Selys, an plagiatus ? / Original of figs. 1, 6, 8, pl. viii, *Ent. News*, vol. xiv. P. P. Calvert.

***ophibolus*** Calvert (***Erpetogomphus***), 1905 : 163, 164, pl. 7, figs. 30–32, 46. Holotype ♂. [Mexico], Vera Cruz, Atoyac, May (*H. H. S*[*mith*]) / Erpetogomphus ophibolus Calv. TYPE ♂. P. P. Calvert det. 1905. B. C. A. Neur., p. 164. Original of pl. 7, figs. 30–32, 46.

***orientalis*** Fraser (***Phyllogomphus***), 1957. Kimmins, 1966 : 207.

***orites*** Laidlaw (***Anisogomphus***), 1922 : 393, figs. 13–14. Holotype ♂. Khasis; 5,000 ft., Shillong, ix.1919 (*Fletcher* coll.) / A. orites ♂ Type [Laidlaw's writing].

All four wings are broken basad of the nodus and two of the apical parts are missing. Currently placed in the genus *Temnogomphus*.

***parvulus*** Selys (***Gomphus***), 1854 : 37. Holotype ♂. N. America, Nova Scotia [replacement for missing label] / Gomphus parvulus de Selys / Gomphus parvulus De Selys.

Currently placed in the genus *Lanthus*.

***pendleburyi*** Laidlaw (***Leptogomphus***), 1934 : 555–556, figs. 1a, b. Holotype ♂. B[rit.] N. Borneo, Mt. Kinabalu, Kiau, 3,000 ft., 5.iv.1929 [with on reverse] (*H. M. Pendlebury*), F.M.S. Museums / Leptogomphus pendleburyi Laidl[aw], ♂ Type, det. D. E. Kimmins.

***pinheyi*** Fraser (***Nepogomphoides***), 1952. Kimmins, 1966 : 209.

***plagiatus*** Selys (***Gomphus***), 1854 : 57. Holotype ♂. United States [replacement label] / Gomphus plagiatus de Selys / Gomphus plagiatus De Selys ♂.
Currently placed in the genus *Stylurus*.

***platyceps*** Fraser (***Gomphidia***), 1953. Kimmins, 1966 : 209.

***praetorius*** Selys (***Gomphus***), 1878 : 106. LECTOTYPE ♂. Transvaal / Gomphus praetorius Selys ♂ Transvaal / Gomphus praetorius Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

***prasinus*** Tillyard (***Austrogomphus***), 1906 : 352–353, pl. 24, fig. 3. LECTOTYPE ♂. [N. Queensland], Kuranda, i.[19]05 / Austrogomphus prasinus Till., ♂ TYPE, R.J.T. / Austrogomphus prasinus Till., ♂ Lectotype, D. E. Kimmins det. 1968.
Currently placed in the genus *Austroepigomphus*.

***pruinans*** Fraser (***Heliogomphus***), 1922. Kimmins, 1966 : 210.

***pryeri*** Selys (***Gomphus***), 1883 : 111. LECTOTYPE ♀. Type [McL. label] / Japan (*Pryer*) / Gomphus [melanops, deleted] Pryeri Selys ♀ Japan / Gomphus pryeri Selys, ♀ Lectotype, D. E. Kimmins det. 1968.

***pulcherrimus*** Fraser (***Onychogomphus***), 1927. Kimmins, 1966 : 210.

***pygmaeus*** Selys (***Progomphus***), 1873 : 502. Holotype ♂ (head missing). Type [McL. label] / Bogota / Prog. pygmaeus Selys ♂.
Currently placed in *Gomphoides*.

***quadracies*** Calvert (***Epigomphus***), 1903 : 172, pl. 7, fig. 36, pl. 8, figs. 4, 5. Holotype ♂. [Guatemala], San Isidro, 1,600 ft. (*Champion*) / Epigomphus quadracies Calv. ♂ P. P. Calvert det. 1905. B.C.A. Neur., p. 172. TYPE, Original of pl. viii, figs. 4, 5.

***risi*** Fraser (***Gomphus***), 1922. Kimmins, 1966 : 211.

***risi*** Fraser (***Mesogomphus***), 1924. Kimmins, 1966 : 211.

***risi*** Laidlaw (***Leptogomphus***), 1932 : 95–96, 1 fig. Holotype ♂. F.M.S., Kedah, Catchment area near Jitra, 7.iv.1928 / Leptogomphus risi ♂ sp. n. [Laidlaw's writing].

***rusticatus*** Fraser (***Mesogomphus***), 1928. Kimmins, 1966 : 211.

***ruwenzorica*** Pinhey (***Diastatomma***), 1961 : 63, pl. 3, figs. 1–3. Holotype ♂. B. Congo, Ruwenzori, Mutwanga, iii.1950 (*T. H. E. Jackson*) / Diastatomma ruwenzorica Pinh. Holotype.

***schmidti*** Fraser (***Onychogomphus***), 1937. Kimmins, 1966 : 213.

***scissus*** McLachlan (***Gomphus***), 1896 : 367–368. Holotype ♀. Szechuen, Siao-Lou / Gomphus scissus McL. Type.
Currently placed as *Sinogomphus*.

***seductus*** Fraser (***Macrogomphus***), 1926. Kimmins, 1966 : 212.

***seimundi*** Laidlaw (***Burmagomphus***), 1931 : 212–214. LECTOTYPE ♂. F.M.S., Kuala Tahan, 350 ft., iii.1921 (*E. Seimund*) / Burmagomphus seimundi ♂ Type [type written] / Burmagomphus seimundi Laidlaw, ♂ Lectotype, det. D. E. Kimmins, 1968.

***senchalensis*** Fraser (ssp. ***Davidius aberrans***), 1926. Kimmins, 1966 : 213.

***siamensis*** Fraser (***Burmagomphus***), 1926. Kimmins, 1966 : 213.

***sinuatus*** Fraser (***Burmagomphus***), 1933. Kimmins, 1966 : 213.

***sipedon*** Calvert (***Erpetogomphus***), 1905 : 165–166, pl. 7, figs. 34, 40, 42. Holotype ♀. [Mexico], Guadaljara, Jalisco, vii (*Schumann*) / Erpetogomphus sipedon Calv. TYPE ♀ (Form *a*), P. P. Calvert, det. 1905. B.C.A. Neur. pp. xxx, 166. Orig. of Pl. vii, ff. 34, 40.

***smithi*** Selys (***Heterogomphus***), 1854 : 29. Lectotype ♂ (Fraser, 1934 : 296). Silhet / Gomphus? smithii De Selys ♂ / Heterogomphus smithi Selys, ♂ Lectotype (Fraser, 1934).

Currently placed in the genus *Megalogomphus*. This specimen for many years carried a BM Holotype label, but this was incorrect since Selys had more than one example and did not specify a type. I consider Fraser's statement (1934 : 296) 'The *type* is a male from Sylhet, in the British Museum . . .' as equivalent to a lectotype designation.

***sobrinus*** Selys (***Gomphus***), 1873 : 745. Holotype ♂. California (*Edwards*) / Type [McL. label] / Gomphus sobrinus Selys ♂.

***sordida*** Selys (***Cyclophylla***), 1854 : 78. Holotype ♂. Para / Gomph. sordidus De Selys / Cyclophylla sordida.

Currently placed in the genus *Cyclophylla*.

***souteri*** Fraser (ssp. ***Microgomphus torquatus***), 1924. Kimmins, 1966 : 214.

***spectabilis*** Campion (***Zonophora***), 1920 : 138–140, pl. 7, fig. 15. Holotype ♂. Paraguay, Sapucay (*W. Foster*) / 64 / Zonophora spectabilis Campion, Holotype, determined by H. Campion.

[***stevensi*** Fraser (***Davidius***), 1923. Kimmins, 1966 : 214, type not traced.]

***striatus*** Fraser (***Onychogomphus***), 1924. Kimmins, 1966 : 214.

***styx*** Pinhey (n. n. for ***Onychogomphus nigrescens*** Pinhey, 1952), 1961 : 87. Holotype ♂. Uganda, Fort Portal, Bwamba Forest, 2,400 ft., iv.1951 (*E. Pinhey*) / Onychogomphus nigrescens Pinh. HOLOTYPE / Onychogomphus styx Pinhey, ♂ Holotype, D. E. Kimmins det. 1968.

***subobtusus*** Selys (***Epigomphus***), 1878 : 467–468. Syntype ♂. Irazu, 6–7,000 ft. (*H. Rogers*) / Epigomphus subobtusus Selys ♂, Irazu / Epigomphus subobtusus Selys, P. P. Calvert det. 1906, B.C.A. Neur., p. 172.

As this example is incomplete and there is another complete syntype ♂ in the Muséum national d'Histoire naturelle, Paris, I have refrained from designating a lectotype.

***superbus*** Fraser (***Megalogomphus***), 1931. Kimmins, 1966 : 215.

***tamaracherriensis*** Fraser (ssp. ***Merogomphus longistigma***), 1931. Kimmins, 1966 : 215.

***tenaculatus*** Fraser (***Libyogomphus***), 1926. Kimmins, 1966 : 216.

***thomassoni*** Kirby (***Aeshna***), 1900 : 534–535, fig. Holotype ♂. Hainan, 5-fingered Mt., (J. T. Thomasson), (with on reverse), Aeshna thomassoni [W.F.K.] / Aeshna thomassoni Kb., Holotype ♂, D. E. Kimmins det. 1968.

Currently placed in *Nihonogomphus*. The abdominal segments 6–10 are missing. The collector's name should be given as J. Whitehead, J. Thomasson being the donor.

***thoracicus*** McLachlan (***Macrogomphus***), 1884 : vii. Holotype ♀. Type [McL. label] / [Malacca], Perak / Macrogomphus thoracicus, McL.

***torquatus*** Selys (***Cyclogomphus***), 1854 : 63. Holotype ♀. Ind[ia] / Gomphus torquatus De Selys ♀ / Cyclog. torquatus de Selys.

***tonkinicus*** Fraser (***Onychogomphus***), 1926. Kimmins, 1966 : 216.

***tumefactus*** Calvert (***Epigomphus***), 1903 : 170, 172, pl. 8, figs. 6, 7. Holotype ♂. Costa Rica, Caché (*Rogers*) / Epigomphus tumefactus Calv., P. P. Calvert det. 1905. B. C. A. Neur., p. 172. TYPE. Original of pl. viii, figs. 6, 7.

***tumens*** Calvert (?***Cyanogomphus***), 1905 : 169, pl. 7, figs. 11, 11a, 41. Holotype ♀. [Mexico], Vera Cruz, Atoyac, v (*H. H. S*[*mith*]). / Cyanogomphus(?) tumens Calv., P. P. Calvert, det. 1905. B. C. A. Neur., p. 169. TYPE, Original of pl. 7, figs. 11, 11a, 41.

***v-flavum*** Fraser (***Burmagomphus***), 1926. Kimmins, 1966 : 217.

***viridior*** Pinhey (***Paragomphus***), 1961 : 84, pl. 6, fig. 3. Holotype ♂. Uganda, Fort Portal Rd, Mubende, iv.1951 (*E. Pinhey*) / *Paragomphus* sp. Markings of *P. hageni*. Anal apps. of *P. moka*, Genitalia of *elpidius* [Fraser's writing] / Paragomphus viridior Pinh., 1956. TYPE ♂.

***volsella*** Calvert (***Gomphoides***), 1905 : 156, pl. 7, figs. 10, 10a, 13, 14. Holotype ♂. [Mexico], Tabasco, Teapa, iv. (*H. H. S[mith]*) / Gomphoides volsella Calv., ♂ TYPE, P. P. Calvert det. 1905. B. C. A. Neur., p. 156, Original of pl. 7, figs. 10, 10a, 13, 14.

Currently placed in the genus *Negomphoides*.

***walli*** Fraser (***Heliogomphus***), 1925. Kimmins, 1966 : 218.

***walli*** Fraser (***Onychogomphus***), 1924. Kimmins, 1966 : 218.

***wheeleri*** Fraser (***Gomphidictinus***), 1942. Kimmins, 1966 : 218.

***wilkinsi*** Fraser (***Cyclogomphus***), 1926. Kimmins, 1966 : 218.

***williamsoni*** Fraser (***Gomphidia***), 1923. Kimmins, 1966 : 218.

***williamsoni*** Laidlaw (***Leptogomphus***), 1912 : 94–95. Holotype ♂. Borneo, Sarawak, Madihit, 2,000 ft., 4.vi.1911 (*J. C. Moulton*) / Leptogomphus williamsoni ♂ Type, 4.vi.11.

***wynaadicus*** Fraser (***Macrogomphus***), 1924. Kimmins, 1966 : 219.

***ypsilon*** Selys (***Cyclogomphus***), 1854 : 62. Lectotype ♂ (by designation of Fraser, 1934 : 182). N. India / Gomphus globifer De Selys ♂ / Cyclog. ypsilon de Selys.

This specimen has for many carried a BM Holotype label. This has now been replaced by a Lectotype label, as I consider that Fraser's statement '*Type*, a male in the British Museum; a paratype in the Selys collection . . .' is in effect a selection of lectotype.

## CORDULEGASTERIDAE

***brevistigma*** Selys (***Cordulegaster***, sg. ***Thecagaster***), 1854 : 103. LECTOTYPE ♂. N. India, 49–52 [label replaced] / Corduleg. brevistigma De Selys, a renvoyer / Cordulegaster brevistigma Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Fraser (1929 : 118) is incorrect in stating that there were 4 ♂ in BM(NH); this should be 3 ♂, 1 ♀. The specimen here designated lectotype has for many years been labelled holotype.

***campioni*** Fraser (***Orogomphus***), 1924. Kimmins, 1966 : 185.

***folia*** Fraser (ssp. of ***Cordulegaster brevistigma***), 1929. Kimmins, 1966 : 192.

***gigantica*** Fraser (***Anotogaster***), 1924. Kimmins, 1966 : 194.

***godmani*** McLachlan (***Cordulegaster***), 1878 : 34. LECTOTYPE ♂. [Costa Rica], Irazu, 6–7,000 ft. (*H. Rogers*) / Type [McL. label] / Cordulegaster Godmani McL. / Cordulegaster godmani McL., P. P. Calvert det. 1905. B. C. A. Neur. p. 174 / Cordulegaster godmani McL., ♂ Lectotype, D. E. Kimmins det. 1968.

***hermionae*** Fraser (***Allogaster***), 1927. Kimmins, 1966 : 195.

***kimminsi*** Fraser (***Chlorogomphus***), 1940. Kimmins, 1966 : 199.

***klossi*** Fraser (***Anotogaster***), 1919. Kimmins, 1966 : 199.

***maculatus*** Selys (***Cordulegaster***), 1854 : 105. Holotype ♀. Georgia / Corduleg. maculatus de Selys / Cordulegaster maculatus De Selys / Cord. maculatus De Selys ♀.

***nipalensis*** Selys (***Cordulegaster*** sg. ***Anotogaster***), 1854 : 102–103. Lectotype ♂ (by designation of Fraser, 1929 : 89). Nepal, Hardwicke Bequest / Nepalensis De Selys ♂ / Cordulegaster Nipalensis De Selys / Anotogaster nipalensis Selys, Lectotype. Fraser, 1929.

This example has for many years been labelled holotype, but Selys did not so indicate it. Fraser (1929 : 89) in effect designated the BM(NH) example as lectotype in his statement 'coll. BM. 1 ♂, the type'.

***olympicus*** Fraser (***Chlorogomphus***), 1933. Kimmins, 1966 : 207.

***palampurensis*** Fraser (ssp. of ***Anotogaster basalis***), 1929. Kimmins, 1966 : 208.

***preciosus*** Fraser (***Chlorogomphus***), 1934. Kimmins, 1966 : 210.

**sayi** Selys (***Cordulegaster***), 1854 : 104. Lectotype ♂ (Fraser, 1929 : 136). Georgia [label much blackened] / Cord. Sayi De Selys / Cordulegaster Sayi De Selys / Cordulegaster sayi Selys, ♂ Lectotype, Fraser, 1929.

Fraser's statement (1929 : 136) 'Coll. Br. Mus., 1 ♂ (the type)' is equivalent to a designation of lectotype.

**selysi** Fraser (***Chlorogomphus***), 1929. Kimmins, 1966 : 213.

**xanthoptera** Fraser (***Orogomphus***), 1919. Kimmins, 1966 : 219.

## PETALURIDAE

**carovei** White (***Petalura***), 1843 : 281–281. Holotype ♂. New Zealand / Petalura Carovei White, New Zealand (*Sinclair*).

Currently placed in the genus *Uropetala*. Fraser (1933 : 237) is in error in stating that the type is in the Selys Collection, and he has omitted the reference to the original description.

**ingentissima** Tillyard (***Petalura***), 1907 : 715–718, pl. 23, figs. 1, 3, 4. LECTOTYPE ♂. [North Queensland], Herberton, i.[19]07 / Petalura ingentissima Till., ♂ TYPE, R.J.T. / Petalura ingentissima Till., ♂ Lectotype, D. E. Kimmins det. 1968.

**pulcherrima** Tillyard (***Petalura***), 1913 : 582–584, pl. 52, figs. 11–14. LECTOTYPE ♂. N. Q[ueensland], Cooktown, i.[19]08 (*R. J. Tillyard*) / Petalura pulcherrima Till., ♂ TYPE, R.J.T. / Petalura pulcherrima Till., ♂ Lectotype, D. E. Kimmins det. 1968.

## AESHNIDAE

**albistyla** Fraser (***Gynacantha***), 1927. Kimmins, 1966 : 177.

**anacantha** Tillyard (***Austroaeschna***), 1908 : 732–735, pl. 35, figs. 7–10, pl. 36, fig. 4. LECTOTYPE ♂. W. A[ustralia], Bridgetown, i.[19]07 (*R. J. Tillyard*) / Austroaeschna anacantha Till., ♂ TYPE, R.J.T. / Austroaeschna anacantha Till., ♂ Lectotype, D. E. Kimmins det., 1968.

**apicalis** Fraser (***Gynacantha***), 1924. Kimmins, 1966 : 178.

**asthenes** Tillyard (***Telephlebia***), 1916 : 41–42, pl. 4, fig. 4, pl. 8, figs. 16, 24, 26, 32. Holotype ♀. S. Q[ueensland], Killarney, 8.i.[19]14 (*E. J. Dumigan*) / Telephlebia asthenes Till., ♀ TYPE, R.J.T.

A second, damaged ♀ from Mt. Tambourine, S. Queensland is excluded by Tillyard from the type-series, leaving the above specimen as holotype.

**auriculata** Tillyard (***Archipetalia***), 1917 : 455–459, text-figs. 1–3. LECTOTYPE ♂. [N.W.] Tas[mania], Cradle Mt., [3,000–4,000 ft.], 18.i[19]17 (*R. J. Tillyard*) / Archipetalia auriculata Till., TYPE ♂, R.J.T. / Archipetalia auriculata Till., ♂ Lectotype, D. E. Kimmins det. 1968.

**bainbriggei** Fraser (***Gynacantha***), 1922. Kimmins, 1966 : 181.

**bakeri** Campion (***Tetracanthagyna***), *in* Laidlaw, 1928 : 129–131, text-fig. 1. Holotype ♂. Philippines, Luzon, Mt. Makiling (*G. F. Baker*) / Tetracanthagyna bakeri Campion, ♂ Holotype [DEK writing].

**bangweuluensis** Kimmins (***Anax***), 1965 : 110–111, fig. 2. Holotype ♂. N. Rhodesia, Lake Bangweulu, Kapola, N. of Kapata, 27.x.1946 (*M. Steele*) / Anax Bangweuluensis Kimmins, ♂ Type, D. E. Kimmins det. 1955.

**biharica** Fraser (***Gynacantha***), 1927. Kimmins, 1966 : 182.

**brevicauda** Tillyard (ssp. ***Telephlebia godeffroyi***), 1916 : 34–36, pl. 3, fig. 3. LECTOTYPE ♂ Vic[toria], [Mount] Macedon, i.[19]06 (*G. Lyell*) / Telephlebia godeffroyi brevicauda Till., TYPE ♂, R.J.T. / Telephlebia godeffroyi brevicauda Till., ♂ Lectotype, D. E. Kimmins det. 1968.

***brunnea*** McLachlan (***Tetracanthagyna***), 1898 : 443. LECTOTYPE ♀. North Borneo (*Waterstradt*) / Tetracanthagyna brunnea McLach. Type / Tetracanthagyna brunnea McL. ♂ Lectotype. D. E. Kimmins det. 1968.

***calliope*** Lieftinck (***Gynacantha***), 1953 : 260–262, fig. 10. Holotype ♂. N. Dutch New Guinea, Waigeu, Camp Nok, 2,500 ft., iv.1938 (*L. E. Cheesman*) / Gynacantha calliope Lieft., ♂ holotype.
Currently placed in the genus *Acanthagyna*.

***calverti*** Kimmins (***Neuraschna***), 1951 : 43046, figs. 1–4. Holotype ♂. E. Peru / Neuraeschna calverti Kimmins, ♂ Type, D. E. Kimmins det. 1950.

***chelifera*** McLachlan (***Gynacantha***), 1896*a* : 416–417. Holotype ♂. Rio de Janeiro / 198 / Type [McL. label] / Gynacantha chelifera Selys ♂ / Gynacantha chelifera McL. Type.
Currently placed in the genus *Acanthagyna*.

***conspersa*** Tillyard (***Caliaeschna***), 1907*a* : 727–729, pl. 68, figs. 3a, 3d. LECTOTYPE ♂. N[ew] S[outh] W[ales], Mittagong, iii.[19]05 (*R. J. Tillyard*) / Caliaeschna conspersa Till., ♂ TYPE, R.J.T. / Caliaeschna conspersa Till., ♂ Lectotype, D. E. Kimmins det. 1968.
Currently placed in *Dendroaeschna*.

***cyclops*** Tillyard (ssp. of ***Telephlebia godeffroyi***), 1916 : 36, pl. 3, figs. 4–5, pl. 4, fig. 3. LECTOTYPE ♂. N[ew] S[outh] W[ales], Dorrigo, 15.xi.[19]11 (*R. J. Tillyard*) / Telephlebia godeffroyi cyclops Till., TYPE ♂, R.J.T. / Telephlebia godeffroyi cyclops Till., ♂ Lectotype, D. E. Kimmins det. 1968.

***cynthiae*** Fraser (***Heliaeschna***), 1939 : 89, fig. 1a. Holotype ♂. Type / H. cynthiae. Entebbe, L. Victoria, Uganda, 5.xi.[19]27 (*Hale-Carpenter*).
This species was unfortunately omitted during re-typing the manuscript of my Fraser Types paper (Kimmins, 1966), although the title of the paper was given in the list of references.

***donaldi*** Fraser (***Anaciaeschna***), 1922. Kimmins, 1966 : 189.

***ellioti*** Kirby (***Aeshna***), 1896 : 124–125. LECTOTYPE ♂. Ruwenzori, 6–8,000 ft., xii (*Scott Elliot*) / ellioti Kirb. type / Aeschna ellioti Kirby, ♂ lectotype, D. E. Kimmins det. 1968.

***erythromelas*** McLachlan (***Aeschna***), 1896*a* : 419–421. Holotype ♀. N.W. India / Sabathu, [near Simla], 12.vii [18]88 / Aeschna erythromelas McL., Type.

***flavomaculata*** Tillyard (ssp. of ***Austroaeschna parvistigma***), 1916 : 47–49. Holotype ♂. N[ew] S[outh] W[ales], [Mt] Kosciusko, [5,000 ft.], 23.i.[19]14 (*A. J. Turner*) / Austroaeschna parvistigma Selys flavomaculata n. subsp. ♂ TYPE, R.J.T.

***fletcheri*** Fraser (***Petaliaeschna***), 1927. Kimmins, 1966 : 192.

***forcipata*** Tillyard (?***Planaeschna***), 1907*a* : 726–727, pl. 68, figs. 1a, 1b. LECTOTYPE ♂. N. Q[ueensland], Kuranda, i.[19]05 (*R. J. Tillyard*) / Austroaeschna forcipata Till., ♂ TYPE, R.J.T. / Austroaeschna forcipata (Till.), ♂ Lectotype, D. E. Kimmins det. 1968.
Currently placed in *Austroaeschna*.

***hardyi*** Tillyard (***Austroaeschna***), 1917 : 461–462, pl. 23, figs. 5–6. LECTOTYPE ♂. [N.W.] Tas[mania], Cradle Mt., 16.i.[19]17 (*R. J. Tillyard*) / Austroaeschna hardyi Till., TYPE ♂, R.J.T. / Austroaeschna hardyi Till., ♂ Lectotype, D. E. Kimmins det. 1968.

***huonensis*** Fraser (***Anaciaeschna***), 1926. Kimmins, 1966 : 196.

***inarmata*** Kimmins (***Neuraeschna***), 1951 : 46–48, figs. 8–9. Holotype ♂. British Guiana, New River, 750 ft., 20.i–23.iii.1938 (*C. A. Hudson*) / Neuraeschna inarmata Kim., ♂ Holotype, D. E. Kimmins det. 1950.

***incisura*** Fraser (***Gyancantha***), 1935. Kimmins, 1966 : 196.

***intersedens*** Martin (***Austroaeschna***), 1909 : 101, pl. 4, fig. 14. LECTOTYPE ♂. Khasia Hills / Planaeschna intersedens ♂ Khasia [Selys' writing] / Austroaeschna intersedens Martin, ♂ Lectotype, D. E. Kimmins det. 1968.

***khasiaca*** McLachlan (***Gynacantha***), 1896*a* : 411–413. LECTOTYPE ♂. Khasia Hills / Gynacantha khasiaca McL. Type / Gynacantha khasiaca McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in *Acanthagyna*.

***libyana*** Fraser (***Gynacantha***), 1928. Kimmins, 1966 : 201.

***longfieldae*** Gambles (***Heliaeschna***), 1967 : 200. Holotype ♀. Mt. Cameroon, 1st Plateau, 12.i.1932 (*M. Steele*) / Heliaeschna sp. n. ♀, det. Miss C. Longfield / Heliaeschna longfieldae Gambles, Holotype ♀, D. E. Kimmins det. 1968.

***longfieldae*** Kimmins (***Coryphaeschna***), 1929 : 489–493, 2 figs. Holotype ♂. Brazil, Matto Grosso, Chapada, N.E. of Cuyabá, Burity, 2,850 ft., 19.vi.1927 (*C. E. Longfield*) / Coryphaeschna longfieldae Kimmins ♂ Type, det. D. E. Kimmins, 1929.

Currently placed in the genus *Castoraeschna*.

***lyttoni*** Fraser (***Gynacantha***), 1926. Kimmins, 1966 : 202.

***maclachlani*** Selys (***Fonscolombia***), 1883 : 126–127. Holotype ♂. Japan (*Pryer*) / 115 / Fonscolombia Maclachlani Selys ♂ Japon.

Currently placed in the genus *Boyeria*.

***millardi*** Fraser (***Gynacantha***), 1920. Kimmins, 1966 : 204.

***milnei*** Selys (***Austroaeschna***), 1883 : 120–121. Holotype ♀. Japan (*Lewis*) / Aeschna Milnei Selys, Japon, ♀ Type.

Currently placed in the genus *Planaeschna*.

***minuscula*** McLachlan (***Aeschna***), 1896*a* : 421–422. LECTOTYPE ♂. Cape [of] Good Hope / Aeschna minuscula McL. Type / Aeschna minuscula McL. ♂ Lectotype, D. E. Kimmins det. 1968.

***nigeriensis*** Gambles (***Acanthagyna***), 1956 : 194–196, 6 text-figs. Holotype ♂. S. Nigeria, Vom, 15.iv.1949 (*R. M. Gambles*) / Acanthagyna nigeriensis Gambles in MS, with on reverse, Type ♂.

***nigrolineatus*** Fraser (***Anax***), 1835. Kimmins, 1966 : 206.

***nocturnalis*** Fraser (***Periaeschna***), 1927. Kimmins, 1966 : 207.

***ornithocephala*** McLachlan (***Aeschna***), 1896 : 368–370. Holotype ♂. [E. Tibet], Moupin / Aeschna ornithocephala McL. Type.

***patricia*** Tillyard (***Phyllopetalia***), 1909 : 699–701, pl. 55, fig. 3. LECTOTYPE ♀. N[ew] S[outh] W[ales], Blue Mts., [Leura], xi.[19]03 (*G. A. Waterhouse*) / Phyllopetalia patricia Till., ♀ TYPE, R.J.T. / Phyllopetalia patricia Till., ♀ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Austropetalia*, this species was first recorded from two females with data as above under the name '*Petalia apollo* Selys'. It was then re-named *Phyllopetalia patricia* Tillyard, with the same two specimens as type-series.

***perrensi*** McLachlan (***Aeschna***), 1887 : 76–77. Holotype ♂, Type [McL. label] / [Argentine Republic], Corrientes, [Goya] (*Perrens*) / Aeschna Perrensi McLach.

Currently placed in the genus *Coryphaeschna*.

***pestilens*** McLachlan (***Hypopetalia***), 1870 : 171–172. Holotype ♂. Type [McL. label] / Chili (*Reade*) / Hypopetalia pestilens McL.

***plagiata*** Waterhouse (***Gynacantha***), 1877 : x; 1878 : 119–120, pl. 4. Holotype ♀. Tetracanthagyna plagiata (Waterh.). *Genotype*, collected in N.E. Borneo by Sir Hugh Low, between 1848 and 1877. See letter from C. F. Cowan on file and *Trans. ent. Soc. Lond.* **1878** : 119.

Now placed in *Tetracanthagyna*. The thorax of the type is in fragments, which have been mounted, with the head, wings and abdomen on a card.

***producta*** Kimmins (***Neuraeschna***), 1933 : 226–228, 2 figs. Holotype ♂. Peru, Iquitos, Mishuyacu, 6.ix.1930 (*Katzenbach*) / Neuraeschna producta sp. n. ♂ Type, det. D. E. Kimmins.

***pustulosa*** Selys (***Allopetalia***), 1873 : 511–512. Holotype ♀. Type [McL. label] / Bogota / Allopetalia pustulosa Selys ♀.

***quadrina*** McLachlan (***Gyancantha***), 1896*a* : 414–416. Holotype ♂. West Africa, Mahambé (*Rutherford*) / Gynacantha quadrina McL. Type.

Currently placed as synonym of *Acanthagyna vesiculata* (Karsch).

***risi*** Laidlaw (***Gynacantha***), 1931 : 205–206, figs. 6–7. Holotype ♂. F.M.S., Perak, Jor Camp, 2,000 ft., 21.viii.1922 (*J. Seimund*) / Gyancantha risi type ♂ / Acanthagyna risi (Laidlaw), ♂ Holotype, D. E. Kimmins det. 1968.

Currently placed in *Acanthagyna*.

***rutherfordi*** McLachlan (***Anax***), 1883 : 128–129. LECTOTYPE ♂. Type [McL. label] / Sierra Leone (*R*[*utherford*]) / Anax Rutherfordi McL. / Anax rutherfordi McL. ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Anax speratus* Hagen.

***scotias*** Pinhey (***Aeshna***), 1952 : 14, figs. 5b, c. Holotype ♂. Uganda, Matuna For[est], 20 m. W. Kampala, 10.v.1952 (*E. Pinhey*) / Aeshna scotias Pinh. ♂ Holotype.

***sevastopuloi*** Pinhey (***Acanthagyna***), 1961 : 100, pl. 7, fig. 6. Holotype ♂. Uganda, 20 m. W. of Kampala, v.1952 (*E. Pinhey*) / Gynacantha sevastopuloi Pinh. 1955, Holotype.

The species was eventually published in the genus *Acanthagyna*.

***sextans*** McLachlan (***Gynacantha***), 1896*a* : 413–414. LECTOTYPE ♂. [Cameroons], Monga-ma Lobah, No.– / Gynacantha sextans McL. Type / Gynacantha sextans McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in *Acanthagyna*.

***striatus*** Kirby (***Anax***), 1889 : 299–300. Holotype ♀. Chili / A. striatus *type* [WFK].

Currently placed as a synonym of *Allopetalia reticulosa* Selys. Kirby was wrong in considering the type to be a male. Although the abdomen had been eviscerated, there is definitely an ovipositor present.

***subpupillata*** McLachlan (***Aeschna***), 1896*a* : 422–424. LECTOTYPE ♂. [S.E. Africa] Brit[ish] Caffraria / Aeschna subpupillata McL., Type / Aeshna subpupillata McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Aeshna rileyi* Calvert.

***tillyardi*** Campion (ssp. ***Telephlebia godeffroyi***), *in* Tillyard, 1916 : 37, 79–80. Holotype ♀. Queensland [Kuranda, near Cairns] (*F. P. Dodd*) / Telephlebia tillyardi Campion. Holotype.

***triangulifera*** McLachlan (***Anaciaeschna***), 1896*a* : 409–411. LECTOTYPE ♂. Delagoa Bay / Anaciaeschna triangulifera McL. Type / Anaciaeschna triangulifera McL., ♂ Lectotype, D. E. Kimmins det. 1968.

I have chosen as lectotype the more mature of the two syntypes.

***tryoni*** Tillyard (***Telephlebia***), 1917 : 459–460, pl. 23, figs. 3–4. LECTOTYPE ♂. [Queensland], Brisbane, xii.[19]01 (*T. Batchelor*) / Telephlebia tryoni Till., TYPE ♂, R.J.T. / Telephlebia tryoni Till., ♂ Lectotype, D. E. Kimmins det. 1968.

***tumorifer*** McLachlan (***Anax***), 1885 : 250–251, 3 figs. LECTOTYPE ♂. Type [McL. label] / Madagascar (*Walter*) / Anax tumorifer McL. / Anax tumorifer McL., ♂ Lectotype, D. E. Kimmins det. 1968.

***ugandica*** McLachlan (***Heliaeschna***), 1896*a* : 419. LECTOTYPE ♂. [East Central Africa] Ouganda (*R. P. Denoit*) / Heliaeschna ugandica McL., Type / Heliaeschna ugandica McL., ♂ Lectotype, D. E. Kimmins det. 1968.

***unifasciata*** Fraser (***Periaeschna***), 1935. Kimmins, 1966 : 217.

***victoriae*** Pinhey (***Acanthagyna***), 1961 : 101, pl. 7, figs. 4, 13. Holotype ♂. Uganda, Katera [Forest], Sango Bay, x.1953 (*T. H. E. Jackson*) / Gynacantha victoriae Pinh. Holotype.

Published as *Acanthagyna*.

***vittata*** McLachlan (***Tetracanthagyna***) 1898 : 440–442. LECTOTYPE ♂. North Borneo (*Waterstradt*) / Tetracanthagyna vittata McLach., Type / Tetracanthagyna vittata McL., ♂ Lectotype, D. E. Kimmins det. 1968.

***walsinghami*** McLachlan (***Anax***), 1883 : 127–128. LECTOTYPE ♂. Type [McL. label] / N[orth] California (*Walsingham*) / Anax Walsinghami McL. / Anax walsinghami McL., ♂ Lectotype, D. E. Kimmins det. 1968.

***waterhousei*** McLachlan (***Tetracanthagyna***), 1898 : 443. LECTOTYPE ♀. Tetracanthagyna Waterhousii Selys ♀ n. sp. Borneo / Tetracanthagyna waterhousei McL., ♀ Lectotype, D. E. Kimmins det. 1968.

The BM(NH) example has been selected as lectotype.

## CALOPTERYGIDAE

***andersoni*** McLachlan (***Mnais***), *in* Selys, 1873*a* : 472. LECTOTYPE ♂. Mnais Andersoni McLachl. ♂, W. Yunnan (104) / Mnais andersoni McL., ♂ Lectotype, D. E. Kimmins det. 1968.

The lectotype now lacks head and left fore wing. The paralectotype ♂ has had abdominal segments 4–10 replaced by segments 6–10 of a ♀ abdomen.

***angustipennis*** Selys (***Calopteryx***, sg. ***Sylphis***), 1853 : 9. Holotype ♂. Georgia / angustipennis Selys / Calopteryx (Sylphis) angustipennis Selys, ♂ Holotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Agrion elegans* Selys. The type now lacks abdominal segments 6–10.

***apicalis*** Kirby (***Neurobasis***), 1891 : 204, pl. 20, figs. 2, 2a. Holotype ♂. Ceylon, Nawalapitiya (*E. E. Green*) / apicalis type [WFK] / Neurobasis apicalis Kirby ♂ Holotype, D. E. Kimmins det. 1968.

Placed by Fraser as a synonym of *Vestalis apicalis* Selys, but appears to be a somewhat teneral form of *Vestalis nigrescens* Fraser, the apices of the wings only slightly enfumed. Fraser states that *nigrescens* has the labrum entirely black, but in his type the margins of the labrum are brownish. Although Kirby's name is earlier than *nigrescens* Fraser, *apicalis* Kirby is a homonym of *apicalis* Selys and *nigrescens* Fraser takes priority.

***atrocyana*** Fraser (***Agrion***), 1935. Kimmins, 1966 : 180.

***atropha*** Lieftinck (***Vestalis***), 1965 : 351–353, fig. 8. Holotype ♂. Sarawak, Mt. Dulit Trail, 10.viii.1932 / Primitive forest / Oxford Univ. Exped. (*B.M. Hobby & A. W. Moore*) / Vestalis atropha Lieft., Holotype, det. M. A. Lieftinck, 1965.

***basilactea*** Kirby (***Archineura***), 1894 : 86, figs. Holotype ♂. Foo Chow (*de La Touche*) / Archineura basilactea Kb. type [WFK].

Currently placed as a synonym of *Archineura incarnata* Karsch.

***beryllae*** Laidlaw (***Vestalis***), 1915 : 273. Holotype ♂. Borneo, Mt. Merinjak, [Retuh], 29.v.1914 (*J. C. Moulton*) / Vestalis beryllae Laidlaw, ♂ Holotype, D. E. Kimmins det. 1968.

The right hand wings have been removed and placed between celluloid for photographing.

***ciliata*** Fabricius (***Agrion***), 1781. Campion (1917 : 447).

***confusa*** Hagen (***Caliphaea***), *in* Selys, 1859 : 440. Holotype ♂. Nepal, Hardwicke Bequest / Caliphaea confusa Hagen.

***consimilis*** McLachlan (***Caliphaea***), 1894 : 434–435. LECTOTYPE ♂. Type [McL. label] / [W. China], Ta-chien-lu / Caliphaea consimilis McL. / Caliphaea consimilis McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Of the two adult males listed by McLachlan, only one can now be traced, and this has been designated Lectotype. Currently placed as a synonym of *Caliphaea confusa* Selys.

***cuprea*** Selys (***Hetaerina***), 1853 : 28. Holotype ♂. 16 / [Brazil], Para / L. cuprea Selys* / H. cuprea / Lais cuprea Selys ♂. Determined by H. Campion.

***devillei*** Selys (***Lais***), 1880 : 1. LECTOTYPE ♂. E. Peru? / L. Devillei Selys 1880. ♂ sous le nom de Hauxwelli, 4e add. no. 30 bis, E. Perou, *verifiée 1880* / Lais devillei Selys, ♂ Lectotype, D. E. Kimmins det. 1968.
Currently placed in the genus *Mnesarete*.

***distincta*** Longfield (***Umma***), 1933 : 139–140, figs. 6, 13. Holotype ♂. [Zambia], Lake Tanganyika (*W. H. Nutt*) / Kambole, vii.1895 / Umma distincta Longf., ♂ Holotype, D. E. Kimmins det. 1968.

***electa*** Longfield (***Umma***), 1933 : 139, figs. 7, 14. Holotype ♂. Katanga, Kambove, 4,000–5,000 ft., 11.iv.1907 [*S. A. Neave*] / Umma electa Longf., ♂ Holotype, D. E. Kimmins det., 1968.

***elwesi*** McLachlan (***Notholestes***), 1887*a* : 32. Holotype ♂. Darjiling (*H. J. Elwes*) / Notholestes Elwesi McLach. / Caliphaea Confusa Hg.
The type now lacks the right fore wing.

***femina*** Longfield (***Umma***), 1947 : 20–21. Holotype ♀. Angola, Miss. sc. suisse, 1932–1933 / Sangeve, ii.[1933] / Umma femina Type ♀, det. Miss C. Longfield.

***fulgida*** Selys (***Lais***), 1879 : 365. LECTOTYPE ♂. [Ecuador], Rio Napo / L. fulgida Selys, 4 add., no. 29 bis. ♂ type, Rio Napo, *verifiée 1880* / Lais fulgida Selys, ♂ Lectotype, D. E. Kimmins det. 1968.
The lectotype now lacks its head. Currently placed in the genus *Mnesarete*.

***fumosa*** Longfield (***Sapho***), 1932 : 206–208, figs. 1–3. Holotype ♂. Sierra Leone, Kamagbonse, 6.iv.1912 (*Jas. J. Simpson*) / Sapho sp. no. 4 [H. Campion's writing] / Sapho fumosa Longfield, ♂ Holotype, D. E. Kimmins det. 1968.

***gloriosa*** McLachlan (***Sapho***), *in* Selys, 1873*b* : 611–612. LECTOTYPE ♂. Type [McL. label] / Gaboon / Sapho gloriosa McLach. ♂ / Sapho gloriosa McL., ♂ Lectotype, D. E. Kimmins det. 1968.

***hauxwelli*** Selys (***Lais***), 1869 : 654. Holotype ♂. Upper Amazon, Pebas (*Hauxwell*) / L. Hauxwelli Selys ♂ type, 2e Add., 30 bis, Peba, *verifiée 1880*.
Currently placed in the genus *Mnesarete*.

***hetaerinoides*** Fraser (***Leucopteryx***), 1933. Kimmins, 1966 : 195.

***icteroptera*** Fraser (***Mnais***), 1929. Kimmins, 1966 : 196.

***imperatrix*** McLachlan (***Lais***), 1878*a* : 85–86. LECTOTYPE ♀. Type [McL. label] / Ecuador, Intaj [(*Buckley*)] / Lais imperatrix McL. / Lais imperatrix McL., ♀ Lectotype, D. E. Kimmins det. 1968.
Two of the three other examples are in BM(NH). Currently placed in the genus *Mnesarete*.

***infecta*** Calvert (***Hetaerina***), 1901 : 38–39, pl. 2, figs. 18, 24. Holotype ♂. [Mexico], Vera Cruz, Atoyac. v (*H. H. S*[*mith*]) / Hetaerina infecta Calv. ♂ type, P. P. Calvert det. 1900. Original of figs. 18, 24, pl. 2, Neur. B. C. A.

***laosica*** Fraser (***Calopteryx***), 1933. Kimmins, 1966 : 200.

***mandarinus*** McLachlan (***Psolodesmus***), 1870 : 166–167. Holotype ♂. [China, Fukien], Amoy / Psolodesmus mandarinus McL., Type.

***maxima*** McLachlan (***Hetaerina***), 1879 : 244. Holotype ♀. Type [McL. label] / [Costa Rica], [Mount] Irazu, 6–7,000 ft. (*H. Rogers*) / Hetaerina maxima McL. / Hetaerina maxima McLach. ♀.

***melania*** Selys (***Vestalis***), 1873*a* : 474–475. LECTOTYPE ♂. Type [McL. label] / Luzon / Vestalis melania de Selys ♂ / Vestalis melania Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

***nigrescens*** Fraser (***Vestalis***), 1929. Kimmins, 1966 : 206.

***oberthuri*** McLachlan (***Calopteryx***), 1894 : 433–434. LECTOTYPE ♂. Type [McL. label] / [W. China], Ta-chien-lu / Calopteryx Oberthuri McL. / Calopteryx oberthuri McL., ♂ Lectotype, D. E. Kimmins det. 1966.
Currently placed in the genus *Matrona*.

***orichalcea*** McLachlan (***Sapho***), 1869 : 27–28. LECTOTYPE ♂. Type [McL. label] / [Gabon], Fernand Vaz / Sapho orichalcea McL. ♂ / Sapho orichalcea McL., ♂ Lectotype, D. E. Kimmins det. 1968.

The ♂ lectotype has the abdomen much compressed and apex of abdomen missing.

***papaverina*** Fraser (***Hetaerina***), 1946. Kimmins, 1966 : 209.

***pilula*** Calvert (***Hetaerina***), 1901 : 33, pl. 2, figs. 27, 35. Holotype ♂. [Mexico], Tabasco, Teapa, i (*H. H. S*[*mith*]) / Hetaerina pilula Calv., ♂ type, P. P. Calvert det. 1900. Original of figs. 27, 35, pl. 2, Neur. Biol. C. Am.

***rudis*** Calvert (***Hetaerina***), 1901 : 40–41, pl. 2, figs. 20, 26. Holotype ♂. [Guatemala], San Geronimo, [Vera Paz], 3,000 ft. (*Champion*) / Hetaerina rudis Calv. ♂ type, P. P. Calvert det. 1900, Original of figs. 20, 26, pl. 2, Neur. B. C. A.

***septentrionalis*** Selys (***Hetaerina***), 1853 : 36. Holotype ♂. Georgia / Hetaer. septentrionalis ♂ De Selys / H. septentrionalis Selys ♂*.

***smaragdina*** Selys (***Calopteryx***), 1853 : 16. LECTOTYPE ♂. [Inde(?)], Communicavit J. Stephens / Smaragdina De Selys / Calopteryx atrata Selys, det. Miss C. Longfield / Calopteryx smaragdina Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

I have designated this specimen as lectotype rather than accept it as holotype, since Selys' measurements suggest that he had seen more than one example.

***sublimbata*** Selys (var. of ***Hetaerina occisa***), 1873*b* : 613. Lectotype ♂ (by designation of Calvert, 1901–08 : 35). Panama / Het. occisa Hag. var. sublimbata Selys / Hetaerina macropus ♂ Selys, P. P. Calvert det. 1900 / B. C. A. Neur., p. 35.

I consider that Calvert's statement (1901–08 : 35) 'Var. *sublimbata*. Hab. Panama (coll. McLachlan : 1 ♂, type of de Selys)' to be equivalent to a designation of lectotype.

***titia*** Drury (***Libellula***), 1773 : pl. 45, fig. 5, pp. 83–84.

There is in the BM(NH), from the McLachlan collection a specimen lacking head and part of abdomen, which is labelled by McLachlan as 'Hetaerina titia Drury, believed to be *Drury's type*.' We have no record of its earlier history. Selys refers to this specimen (1873, *Bull. Acad. R. Belg.* (2) **36** : 613.

***tolteca*** Calvert (***Hetaerina***), 1901 : 40, pl. 2, figs. 19, 25. Holotype ♂. Mexico, Jalapa (*M. Trujillo*) / Hetaerina tolteca Calv. ♂ type, P. P. Calvert det. 1901. Original of figs. 19, 25, pl. 2, Neur. Biol. C.-Am.

## EUPHAEIDAE

***alma*** Selys (***Epallage***), 1879 : 372. Holotype ♀. Persia, Astrabad / Epallage alma Selys ♀.

***balica*** McLachlan (var. of ***Euphaea lara***), 1898*a* : 272. Holotype ♂. Bali (*W. Doherty*) / Euphaea Lara Kr. var. balica McL.

***basalis*** Laidlaw (***Pseudophaea***), 1915*a* : 32. Holotype ♂. Borneo, Mt. Kina Balu, 11.ix.1913 (*J. C. Moulton*) / Pseudophaea basalis Laidlaw, ♂ Type, D. E. Kimmins det. 1968.

Laidlaw designated this example as holotype by his statement 'The type-male is deposited in the British Museum [(Natural History)]'. Currently placed in the genus *Euphaea*.

***bocki*** McLachlan (***Euphaea***), 1880 : 204–205. Holotype ♂. Type [McL. label] / Sumatra (*Bock*) / Euphaea Bocki McL.

***cardinalis*** Fraser (***Pseudophaea***), 1924. Kimmins, 1966 : 185.

***carissima*** Kirby (***Pseudophaea***), 1894*a* : 559–560, pl. 42, fig. 4. LECTOTYPE ♂. Ceylon, Yerbury Coll. / Haycock Hill, 27.iv.[18]92 / carissima, type [WFK] / Pseudophaea carissima Kirby, ♂ Lectotype, D. E. Kimmins det. 1968.

I have selected as lectotype the ♂ with 'two reddish-tawny appendages at the extremity of the 8th segment beneath.' These 'appendages' are in fact two discoloured threads of silk or cotton, which have been threaded through the specimen to render the abdomen less fragile. The undiscoloured ends can be seen under the head. The species is currently placed as a synonym of *Euphaea splendens* Selys.

***compar*** McLachlan (***Euphaea***), 1870 : 167–168. LECTOTYPE ♂ (incomplete). Amoy / compar McL. / Euphaea compar McLachlan, ♂ Lectotype, D. E. Kimmins det. 1968.

***ethelae*** Fraser (***Dysphaea***), 1924. Kimmins, 1966 : 191.

***gloriosa*** Fraser (***Dysphaea***), 1938. Kimmins, 1966 : 194.

***kali*** Cowley (***Bayadera***), 1936 : 447–482, 8 text-figs. Holotype ♂. Assam, Khasi Hills, N. N. Dunnai vend. / Bayadera kali sp. n. Holotype. Khasi Hills, Assam, N. N. Dunnai vd., det. J. Cowley, 1936.

***laidlawi*** Kimmins (***Euphaea***), 1936 : 77–78, fig. 5c. Holotype ♂. [Sarawak], Lawas, ii.1896 (Everett Coll.) / Euphaea laidlawi sp. n., det. D. E. Kimmins.

***lombockensis*** McLachlan (var. of ***Euphaea lara***), 1898*a* : 272–273. LECTOTYPE ♂. Type [McL. label] / Lombok, Sapit, 2,000 ft., iv.1896 (*H. Fruhstorfer*) / Euphaea Lara, Kr., var. Lombockensis McL. / Euphaea lara, var. lombockensis McL. ♂ Lectotype, D. E. Kimmins det. 1968.

***longicauda*** Fraser (***Bayadera***), 1928. Kimmins, 1966 : 201.

***ornata*** Campion (***Pseudophaea***), 1924 : 174–175. Holotype ♂. Hainan, 5-fingered Mt. (J. T. Thomasson) / Pseudophaea ornata Campion, ♂ Holotype. Determined by H. Campion.

Currently placed in the genus *Euphaea*. The specimen was collected by J. Whitehead, J. T. Thomasson being the donor.

***subnodalis*** Laidlaw (***Pseudophaea***), 1915*a* : 31–32. Holotype ♂. Borneo, Mt. Kina Balu, ix–x.1913 (*J. C. Moulton*) / Euphaea subnodalis ♂ Type [in Laidlaw's writing] / Pseudophaea subnodalis Laidlaw ♂ Type, D. E. Kimmins det. 1968.

The label giving the precise date of capture is no longer available. The holotype was designated by Laidlaw's statement 'The type-male and the female described above will be deposited in the British Museum [(Nat. Hist.)]'. Currently placed in the genus *Euphaea*.

***subplatystyla*** Fraser (***Anisopleura***), 1934. Kimmins, 1966 : 215.

***superba*** Kimmins (***Euphaea***), 1936*a* : 147–149, figs. 1–4. Holotype ♂. Tonkin / Euphaea superba sp. n. ♂, det. D. E. Kimmins.

***walli*** Fraser (***Dysphaea***), 1927. Kimmins, 1966 : 218.

## AMPHIPTERYGIDAE

***coerulescens*** Tillyard (ssp. of ***Diphlebia euphoeoides***), 1913*a* : 235–236. LECTOTYPE ♂. Q[ueensland, Mt.] Tambourine, 27.xi.[19]12 (*R. J. Tillyard*) / Diphlebia euphoeoides coerulescens Tillyd, ♂ TYPE, R.J.T. / Diphlebia euphoeoides coerulescens Tillyd, ♂ Lectotype, D. E. Kimmins det. 1968.

[***euphoeoides*** Tillyard (***Diphlebia***), 1907*b* : 394–398. The specimen with Tillyard's determination label, marked TYPE, is in Canberra. (Communication from J. A. L. Watson, 10.x.68) D.E.K.]

***hybridoides*** Tillyard (***Diphlebia***), 1912 : 587–588, pl. 20, figs. 5, 9. LECTOTYPE ♂. [North Queensland], Kuranda, xii.[19]07 [(*F. P. Dodd*)] / Diphlebia hybridoides Till., ♂ TYPE, R.J.T. / Diphlebia hybridoides Till., ♂ Lectotype, D. E. Kimmins det. 1968.

***lestoides*** Selys (***Amphipteryx***), 1853 : 67. Holotype ♂. Australasia / Amphipteryx lestoides De Selys / Amphipteryx lestoides Selys, ♂ Type, D. E. Kimmins det. 1968.

Now placed in the genus *Diphlebia*.

***loringae*** Fraser (***Philoganga***), 1927. Kimmins, 1966 : 202.

***multinervosa*** Fraser (***Diphlebia***), 1933. Kimmins, 1966 : 205.

***nymphoides*** Tillyard (***Diphlebia***), 1912 : 588–590, pl. 20, figs. 4, 8. LECTOTYPE ♂. [New South Wales], Caroca [Rocky Creek], 17.xii.[19]10 (*R. J. Tillyard*) / Diphlebia nymphoides Till., ♂ TYPE, R.J.T. / Diphlebia nymphoides Till., ♂ Lectotype, D. E. Kimmins det. 1968.

***tillyardi*** Fraser (ssp. of ***Diphlebia lestoides***), 1956. Kimmins, 1966 : 216.

***tiomanensis*** Laidlaw (ssp. of ***Devadatta argioides***), 1934*a* : 102 (in key). Holotype ♂. Johore, Pulau Tioman, Sedagong, vi.1929 / Devadatta argioides tiomanensis Laidl., ♂ Type, D. E. Kimmins det. 1968.

## CHLOROCYPHIDAE

***abbreviata*** Fraser (ssp. ***Rhinocypha biforata***), 1928. Kimmins, 1966 : 176.

***adami*** Fraser (***Ceylonosticta***), 1933. Kimmins, 1966 : 176.

***albistigma*** Selys (***Rhinocypha***), 1873*b* : 615. Holotype ♂. Bac[Batchian] / Wallace / Rhinocypha albistigma Selys, ♂ Holotype, D. E. Kimmins det. 1968.

Selys noted that head and legs were missing. The type now lacks also the apex of the abdomen. Selys' statement that the type bore a label '75.a.c' is a misreading of Wallace's label 'Bac.'

***anambae*** Laidlaw (ssp. ***Rhinocypha biseriata***), 1932*a* : 99–100, fig. 1. LECTOTYPE ♂. Anamba Is., Telok Padang, Jimaga, 20–21.iv.[19]28 (*M. R. Henderson*) / Rhinocypha biseriata anambae ♂ Laidlaw / Rhinocypha biseriata anambae Laidlaw, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Heliocypha biseriata* (Selys).

***angolense*** Longfield (ssp. ***Platycypha caligata***), 1959 : 27–28. Holotype ♂. S.[W.] Angola, Ongueria, 25.ix.1949. / Platycypha caligata angolense Type ♂, det. Miss C. Longfield.

***annandalei*** Laidlaw (***Micromerus***), 1903 : 197–198. Holotype ♂. Malacca, [Jalor], Mabek, 24.vii.[19]01 (*Annandale*) / Micromerus annandalei sp. n. ♂ Type.

Currently placed as a synonym of *Libellago aurantiacus* (Selys).

***armageddoni*** Fraser (***Chlorocypha***), 1940. Kimmins, 1966 : 179.

***beatifica*** Fraser (ssp. ***Rhinocypha perforata***), 1927. Kimmins, 1966 : 181.

***beesoni*** Fraser (***Rhinocypha***), 1922. Kimmins, 1966 : 181.

***bicolor*** Fraser (ssp. ***Chlorocypha curta***), 1941. Kimmins, 1966 : 181.

***bifenestrata*** Fraser (***Rhinocypha***), Kimmins, 1966 : 182.

***bisignatus*** McLachlan (***Micromerus***), 1870 : 168–169. Holotype ♂. [Celebes] Tondano / Menado (*Wallace*) / bisignatus McL. / penis drawn, J. Cowley, vii.1935 / Micromerus bisignatus McL., ♂ Holotype, D. E. Kimmins det. 1968.

According to Bradley & Betrem, 1967, *Bull. Brit. Mus. nat. Hist.* (Ent.) **20** (7) : 292, Wallace collected in this part of Celebes vi–ix.1859. This species is currently placed in *Sclerocypha*.

***caerulea*** Kimmins (***Rhinoneura***), 1936 : 79–81, figs. 6–7. Holotype ♂. Sarawak, Mt. Dulit, 4,000 ft., Moss forest, 22.x.1932 / (Native collector) / Rhinoneura caerulea sp. n. ♂ Type, det. D. E. Kimmins / penis drawn J. Cowley, viii.1935.

***cancellata*** Selys (***Libellago***), 1879 : 383–384. LECTOTYPE ♂. Mongoma Lobah, No. 409 / Libellago cancellata Selys, ♂ adulte / Libellago cancellata Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Chlorocypha*.

***cognata*** Kimmins (***Rhinocypha***), 1936 : 84–85, fig. 8. LECTOTYPE ♂. Sarawak, Mt. Dulit, Dulit Trail, 10.viii.1932. / Over stream / Primitive forest / Oxford Univ. Exp. (*B. M. Hobby & A. W. Moore*) / Rhinocypha cognata sp. n. ♂, det. D. E. Kimmins / Rhinocypha cognata Kimmins, ♂ Lectotype, D. E. Kimmins det. 1968.

***cordosa*** Fraser (ssp. ***Chlorocypha dispar***), 1947. Kimmins, 1966 : 187.

***croceus*** Longfield (***Chlorocypha***), 1947 : 17–20, fig. 7. Holotype ♂. [S. Angola], Bimbi, x.1932 / Angola, Miss. sc. suisse, 1932–33 / Chlorocypha croceus Type ♂, det. Miss C. Longfield.

***finalis*** Hagen, *in* Selys (***Micromerus***) 1869 : 665; Selys, 1873 : 616. Holotype ♂. Ceylon / Micromerus finalis (Hagen) Selys. ♂ Holotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Libellago*.

***frontalis*** Selys (***Rhinocypha***), 1873*a* : 490–491. LECTOTYPE ♂. Type [McL. label] / Moluques, Lorquin / Rh. frontalis de Selys [Selys' writing] / Rhinocypha frontalis de Selys, ♂ Lectotype. D. E. Kimmins det. 1968.

This specimen was part of the McLachlan collection.

***greeni*** Laidlaw (***Micromerus***), 1924 : 352–354, fig. 5. Holotype ♂. Ceylon, Central Province, Peradeniya, 10.vii.1910 (*E. E. Green*) / Type ♂ greeni [Laidlaw's writing] / Micromerus greeni Laidlaw, ♂ Type, D. E. Kimmins det. 1968.

Currently placed in the genus *Libellago*.

***greenwayi*** Pinhey (***Platycypha***), 1950 : 18–22, fig. 6. Holotype ♂. T[anganyika] T[erritory], E. Usambara [Mts], Amani, iii.1950 (*E. Pinhey*) / In cop A / Holotype, Platycypha greenwayi E. Pinhey det. 1950.

***hemihyalina*** Fraser (ssp. ***Rhinocypha quadrimaculata***), 1922. Kimmins, 1966 : 195.

***hilaryae*** Fraser (***Rhinocypha***), 1927. Kimmins, 1966 : 195.

***indicus*** Fraser (ssp. ***Micromerus lineatus***), 1926. Kimmins, 1966 : 197.

***inyangae*** Pinhey (ssp. ***Platycypha fitzsimonsi***), 1958 : 106–107, figs. 3a, 5(1). LECTOTYPE ♂. S. Rhodesia, Inyanga Dist., Nyererwe River, 25.xi.1951 / Type ♂, Platycypha fitzsimonsi inyangae Pinh. 1956/Platycypha fitzsimonsi, Pinhey, ♂ Lectotype, D. E. Kimmins det. 1968.

***jacksoni*** Pinhey (***Chlorocypha***), 1952 : 13–14, fig. 5d–g. Holotype ♂. Uganda, Kigezi Distr., Mafuga Forest, i.1952 (*T. H. E. Jackson*) / Chlorocypha jacksoni Pinh. Holotype.

***javana*** Laidlaw (ssp. ***Melanocypha snellemani***), 1950 : 274–276, figs. 7–8. Holotype ♂. Java, Preangan, Ledru / Melanocypha snellemani javana Laidlaw (Mss) / Type ♂.

***laidlaw*** Fraser (***Rhinocypha***), 1924. Kimmins, 1966 : 200.

***lombockensis*** McLachlan (***Libellago***), 1898*a* : 273–274. LECTOTYPE ♂. Type [McL. label] / Lombok, Sapit, 2,000 ft., iv.1896 (*H. Fruhstorfer*) / Libellago lombockensis McL. / Libellago lombockensis McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Rhinocypha pagenstecheri* Foerster.

***monochroa*** Selys (***Rhinocypha***), 1873 : 614–615. LECTOTYPE ♂. Celebes / Rhinocypha monochroa Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

The lectotype ♂ is the example which has for many years carried a BM type-label. Two examples from the McLachlan collection, labelled 'Type' by him, cannot be syntypes, as the original description mentions only six examples in BM(NH).

***moultoni*** Laidlaw (***Rhinocypha***), 1915*a* : 35–37. LECTOTYPE ♂. Borneo, Kina Balu, 1.x.1913 (*J. C. Moulton*) / Rhinocypha moultoni Type ♂, penis drawn, J. Cowley, viii.1935 / Rhinocypha moultoni Laidlaw, ♂ Lectotype, D. E. Kimmins det. 1968.

Although Laidlaw labelled this specimen 'Type ♂', he gave no published designation of type-specimen from the type-series.

***pelops*** Laidlaw (***Rhinocypha***), 1936 : 60–61, pl. 1, fig. 1. Holotype ♂. Perak, Gunong Kledang, 2,646 ft., xi.1916 / Rhinocypha pelops sp. n., Holotype ♂. / Penis drawn, J. Cowley, viii.1935.

***radix*** Longfield (ssp. ***Chlorocypha glauca***), 1959 : 28–29, fig. 4b. Holotype ♂. [S.] Nigeria, Ado Ekiti, 19.iii.1954 (*R. M. Gambles*) / Chlorocypha glauca radix Type ♂, det. Miss C. Longfield.

***rufescens*** Selys (***Micromerus***), 1873*b* : 617–618. LECTOTYPE ♂. Celebes or Menado / Wings in slide cabinet / Penis drawn, J. Cowley, viii.1934 / Micromerus rufescens Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

This is the specimen referred to as the holotype by Cowley (1937 : 5, fig. 11). Currently placed in the genus *Libellago*.

***semiopacus*** Selys (***Micromerus***), 1873*b* : 617. Holotype ♂. Sar[awak] 85 / Micromerus semiopacus Selys, ♂ Holotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Libellago*.

***tenuis*** Longfield (***Chlorocypha***), 1936 : 468–470, figs. 1a–d. Holotype ♂. Central Africa, Uganda, Toro Distr., Kibale Forest, 2.iii.1934, near river (*C. E. Longfield*) / 221 / Chlorocypha tenuis sp. nov. Type ♂, det. Miss C. Longfield.

***villosipes*** Laidlaw (***Rhinoneura***), 1915*a* : 33–35, figs. 4, 5. Holotype ♂. Borneo (*J. C. Moulton*) / Rhinoneura villosipes ♂ Laidlaw Type. Kina Balu, Borneo, 6.ix.1913 (*J. C. Moulton*) / Penis drawn, J. Cowley, viii.1935.

***vitrinella*** Fraser (***Rhinocypha***), 1935. Kimmins, 1966 : 218.

***whiteheadi*** Kirby (***Rhinocypha***), 1900 : 536–537, pl. 12, fig. 4. LECTOTYPE ♂. Hainan, 5-fingered Mt., J. T. Thomasson / Rhinocypha Whiteheadi Kb. *Type* / Rhinocypha whiteheadi Kirby, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Heliocypha*, as a synonym of *H. perforata* (Percheron). It may be noted that, although J. T. Thomasson's name appears on the locality label, he was in fact the donor of the material, the collector being John Whitehead.

## REFERENCES

CALVERT, P. P. 1901–08. Odonata in *Biologia Centrali-Americana* : 17–420, pls 2–10.

CAMPION, H. *In* TILLYARD, R. J. 1916. Description of a new form of *Telephlebia*. *J. Linn. Soc.* (Zool.) **33** Appendix B : 79–80.

—— 1917. On Fabricius's types of Odonata in the British Museum (Natural History). *Ann. Mag. nat. Hist.* (8) **19** : 441–450.

—— 1920. Some new or little known gomphine dragonflies of S. America. *Ann. Mag. nat. Hist.* (9) **6** : 130–141, pls 6, 7.

—— 1923. Descriptions of three new species of *Notogomphus* (Odonata) from East Africa. *Ann. Mag. nat. Hist.* (9) **12** : 659–669, 4 figs.

—— 1924. Notes on two species of *Pseudophaea* (Odonata). *Ann. Mag. nat. Hist.* (9) **13** : 173–176.

COWLEY, J. 1934. Notes on Odonata (Corduliidae) of the Neotropical Region. *Stylops* **3** (4) : 91–95, 2 figs.

—— 1936. A new species of *Bayadera* (Odonata). *Ann. Mag. nat. Hist.* (10) **18** : 477–482, 8 text-figs.

—— 1937. The penis of the Chlorocyphidae (Odonata) as a group-character. *Trans. R. ent. Soc. Lond.* **86** : 1–18, 60 text-figs.

DRURY, D. 1773. *Illustrations of Natural History, . . . Exotic Insects*, etc. vol. II. London.

FRASER, F. C. 1929. A revision of the Fissilabioidae (Cordulegasteridae, Petaliidae and Petaluridae) (Order Odonata). Part I. Cordulegasteridae. *Mem. Indian Mus.* **9** (3) : 69–167, pls 9–12, 35 text-figs.

—— 1933. Ibid., Part II. Petaliidae and Petaluridae and Appendix to Part I. *Mem. Indian Mus.* **9** (6) : 205–260, 31 text-figs.

—— 1934. *The Fauna of British India, including Ceylon and Burma.* Odonata, vol. II, xxxiii + 392, 4 col. pls, 120 text-figs. London.

—— 1939. *Heliaeschna cynthiae*, a new species of dragonfly from Uganda (Order Odonata). *Proc. R. ent. Soc. Lond.* (B) **8** : 88–90, 2 figs.

GAMBLES, R. M. 1956. A new species of *Acanthagyna* Kirby, 1890 (Odon., Aeshnidae) from North Nigeria. *Entomologist's mon. Mag.* **92** : 194–196, 6 text-figs.

—— 1967. The type-specimens of some West African dragonfly species. *Entomologist* **100** : 196–201, 2 figs.

KIMMINS, D. E. 1929. *Coryphaeschna longfieldae* sp. n. (Odonata), from Brazil, and its allies. *Ann. Mag. nat. Hist.* (10) **3** : 489–493, 2 text-figs.

—— 1931. *Phyllogomphus coloratus*, a new African dragonfly (Odonata, fam. Gomphidae) *Ann. Mag. nat. Hist.* (10) **7** : 217–219, 4 figs.

—— 1933. A new species of *Neuraeschna* (Odonata). *Entomologist* **66** : 226–228, 2 figs.

—— 1936. The Odonata of the Oxford University Sarawak Expedition. *J. fed. Malay St. Mus.* **18** (1) : 65–108, 17 text-figs.

—— 1936*a*. A new species of *Euphaea* (Odonata). *Ann. Mag. nat. Hist.* (10) **17** : 147–149, figs 1–4.

—— 1951. Two new South American Aeshnidae (Odonata). *Ent. News* **62** : 43–48, 9 figs.

—— 1955. Three new species of African Odonata. *Entomologist* **88** : 109–113.

—— 1958. New species and subspecies of Odonata. *Bull. Brit. Mus. nat. Hist.* (Ent.) **7** (7) : 347–358, 7 text-figs.

—— 1966. A list of the Odonata types described by F. C. Fraser, now in the British Museum (Natural History). *Bull. Brit. Mus. nat. Hist.* (Ent.) **18** (6) : 173–227.

KIRBY, W. F. 1889. Descriptions of new genera and species of Odonata in the collection of the British Museum, chiefly from Africa. *Proc. zool. Soc. Lond.* **1889** : 297–303.

—— 1891. On some Neuroptera Odonata (Dragonflies) collected by Mr. E. E. Green in Ceylon. *Proc. zool. Soc. Lond.* **1891** : 203–206, pl. 20.

—— 1894. On a new genus and species of Agrionidae from Foo Chow. *Ann. Mag. nat. Hist.* (6) **13** : 84–86, 2 figs.

—— 1894*a*. Catalogue of the described Neuroptera Odonata (Dragonflies) of Ceylon, with descriptions of new species. *Journ. Linn. Soc.* (Zool.) **24** : 545–566, pls 41, 42.

—— 1896. On a new dragonfly captured by Mr. Scott Elliot in East Africa. *Ann. Mag. nat. Hist.* (6) **17** : 124–125.

—— 1897. List of the Neuroptera collected by Mr. E. E. Austen on the Amazons etc., during the recent expedition of Messrs Siemens Bros. Cable S. S. ' Faraday ', with descriptions of several new species of Odonata (Dragonflies). *Ann. Mag. nat. Hist.* (6) **19** : 598–617, pls 12–13.

—— 1899. On a collection of Odonata (Dragonflies) from Panama. *Ann. Mag. nat. Hist.* (7) **3** : 362–371, pl. 15.

—— 1900. On a small collection of Odonata (Dragonflies) from Hainan, collected by the late John Whitehead. *Ann. Mag. nat. Hist.* (7) **5** : 530–539, pl. 12.

LAIDLAW, F. F. 1903. Odonata. Part I. *Fasc. Malay. Zool.* **1** : 189–200.

—— 1912. An expedition to Mount Batu Lawi. Appendix VIII. List of the Odonata taken on an expedition to Mount Batu Lawi, together with descriptions of supposedly new species. *J. Straits Br. R. Asiatic Soc.* **63** : 92–99.

—— 1914. Contributions to a study of the dragonfly fauna of Borneo. Part II. The Gomphinae and Chlorogomphinae. *Proc. zool. Soc. Lond.* **1914** : 51–63, 1 pl.

—— 1915. Some additions to the dragonfly fauna of Borneo. *Sarawak Mus. J.* **6** : 273–275.

—— 1915*a*. Contributions to a study of the dragonfly fauna of Borneo. Part III. A collection made on Mount Kina Balu by Mr. J. C. Moulton in September and October, 1913. *Proc. zool. Soc. London.* **1915** : 25–39, text-figs 1–5.

—— 1922. A list of the dragonflies recorded from the Indian Empire, with special reference to the collection of the Indian Museum. Part V. The subfamily Gomphinae. *Rec. Indian Mus.* **24** (3) : 367–414, 21 figs.

—— 1923. A survey of the dragonfly fauna of the Malay Peninsula, with notes on that of neighbouring countries. Part I. *J. Malayan Br. R. Asiat. Soc.* **1** : 319–333, figs.

—— 1924. A catalogue of the dragonflies (Odonata) recorded from Ceylon, based upon material collected by Mr. E. E. Green, with description of a new species. *Spolia Zeyl.* **12** : 335–374, 15 figs.

—— 1925. Descriptions of a new genus and two new species of dragonflies (Odonata) belonging to the family Gomphidae from tropical Asia. *Proc. zool. Soc. Lond.* **1925** : 439–444, 2 figs.

LAIDLAW, F. F. 1928. Notes on oriental dragonflies (Odonata), with descriptions of new species. *Proc. zool. Soc. Lond.* **1928** : 129–138, 3 text-figs.

—— 1931. The dragonflies of the Malay Peninsula. *J. fed. Malay St. Mus.* **16** : 175–233, 7 figs.

—— 1932. Notes on Malaysian dragonflies (Odonata), with descriptions of new species. *Bull. Raffles Mus.* **7** : 95–98, 3 figs.

—— 1932*a*. A list of dragonflies (Odonata) collected on the Anamba Islands, South China Sea. *Bull. Raffles Mus.* **7** : 99–100, 1 text-fig.

—— 1934. A note on the dragonfly fauna (Odonata) of Mount Kina Balu and some other mountain areas of Malaysia. With a description of some new or little known species. *J. fed. Malay St. Mus.* **17** (3) : 549–561, 4 figs.

—— 1934*a*. Notes on some oriental dragonflies (Odonata), with a description of a new species. *Stylops* **8** : 99–103, 1 fig.

—— 1936. Note on some species of *Rhinocypha*, with description of a new species. *J. fed. Malay St. Mus.* **18** : 60–64.

—— 1950. A survey of the Chlorocyphidae (Odonata : Zygoptera), with diagnoses of proposed new genera and description of a new geographical subspecies. *Trans. R. ent. Soc. Lond.* **101** (8) : 257–280, 8 figs.

LIEFTINCK, M. A. 1953. Additions to the odonate fauna of the Indo-Australian Archipelago. *Treubia* **22** : 233–269, 11 text-figs.

—— 1965. The species-group of *Vestalis amoena* Selys, 1853 in Sundaland (Odonata, Calopterygidae). *Tijdschr. Ent.* **108** : 325–364, 14 text-figs.

LONGFIELD, C. 1932. A new species of the genus *Sapho* from Sierra Leone. *Stylops* **1** (9) : 206–208, 3 text-figs.

—— 1933. Two new species of the genus *Umma* (Odonata). *Stylops* **2** (6) : 139–140.

—— 1936. Studies of African Odonata, with synonymy and descriptions of new species and subspecies. *Trans. R. ent. Soc. Lond.* **85** : 467–498, 10 text-figs.

—— 1947. The Odonata of South Angola. *Archos Mus. Bocage* **16** : 1–31, 11 figs.

—— 1951. A new African *Microgomphus* and notes on some asiatic types (Odonata). *Ent. News* **63** : 97–102, figs 1 A–F.

—— 1959. The Odonata of N. Angola. Part II. *Publçoes cult. Co. Diam. Ang.* **45** : 13–42, 6 figs.

MARTIN, R. 1908–09. Aeschnines. *Coll. zool. Selys Longchamps.* fasc. **18–20** : 1–223, 6 pls, 219 text-figs. Bruxelles.

—— 1915. Insectes Pseudonéuroptères, Odonata. *Voyage Ch. Alluaud et R. Jeannel en Afrique orientale*, pp. 21–50, pls i–iii. Paris.

MCLACHLAN, R. 1869. Diagnoses of three new species of Calopterygina. *Entomologist's mon. Mag.* **6** : 27–28.

—— 1870. Descriptions of a new genus and four new species of Calopterygidae, and of a new genus and species of Gomphidae. *Trans. ent. Soc. Lond.* **1870** : 165–172.

—— 1878. Description of a new species of *Cordulegaster* from Costa Rica. *Entomologist's mon. Mag.* **15** : 35.

—— 1878*a*. Calopterygina collected by Mr. Buckley in Ecuador and Bolivia. *Trans. ent. Soc. Lond.* **1878** : 85–94.

—— 1879. Description of a new species of *Hetaerina* from Costa Rica. *Entomologist's mon. Mag.* **15** : 244.

—— 1880. On Calopterygina from the Island of Sumatra, collected by Herr Carl Bock. *Entomologist's mon. Mag.* **16** : 203–206.

—— 1883. Two new species of *Anax*, with notes on other dragonflies of the same genus. *Entomologist's mon. Mag.* **20** : 127–131.

—— 1884. Description de deux espèces nouvelles de Gomphines orientales. *C. r. Soc. ent. Belg.* **28** : vii–x.

—— 1885. A new dragonfly of the genus *Anax* from Madagascar. *Entomologist's mon. Mag.* **21** : 250–251.

McLachlan, R. 1887. A new species of *Aeschna* from South America. *Entomologist's mon. Mag.* **24** : 76–77.

—— 1887*a*. *Notholestes elwesi*, a new genus and species of Calopterygina. *Entomologist's mon. Mag.* **24** : 31–32.

—— 1894. On two small collections of Neuroptera from Tachien-lu, in the province of Szechuen, Western China, on the frontier of Thibet. *Ann. Mag. nat. Hist.* (6) **13** : 421–436.

—— 1896. On Odonata from the province of Szechuen, in Western China, and from Moupin, in Eastern Thibet. *Ann. Mag. nat. Hist.* (6) **17** : 364–374.

—— 1896*a*. On some Odonata of the subfamily Aeschnina. *Ann. Mag. nat. Hist.* (6) **17** : 409–425.

—— 1898. Considerations on the genus *Tetracanthagyna* Selys. *Trans. ent. Soc. Lond.* **1898** : 439–444.

—— 1898*a*. On two new species of Calopteryginae from the Island of Lombock, with varietal notes. *Entomologist's mon. Mag.* (2) **9** : 272–274.

Pinhey, E. 1950. *Platycypha greenwayi*, a new species of *Platycypha* from Tanganyika. *Bull. Inst. r. Sci. nat. Belg.* **26** : 18–22, fig. 6.

—— 1952. Three new species of Odonata from Eastern Africa. *Occ. Pap. Coryndon meml Mus.* **3** : 13–16, fig. 5.

—— 1956. A new Rhodesian dragonfly of the family Gomphidae. *Occ. Pap. natn. Mus. Sth. Rhod.* **21**B : 83–84, fig. 1.

—— 1958. Records of dragonflies from the Zambezi and Rhodesia; a revision of the genus *Platycypha*; a gynandromorph dragonfly from Uganda. *Occ. Pap. natn. Mus. Sth. Rhod.* **22**B : 97–116, 7 figs.

—— 1961. *A survey of the dragonflies (Order Odonata) of Eastern Africa*. British Museum (Nat. Hist.), London. vii + 214 pp., 11 pls, 2 text-figs.

Selys Longchamps, E. de. 1853. Synopsis des Caloptérygines. *Bull. Acad. r. Belg. Cl. Sci.* **20**, Annexe : 1–73.

—— 1854. Synopsis des Gomphines. *Bull. Acad. r. Belg. Cl. Sci.* (2) **21** : 20–112.

—— 1859. Additions au synopsis des Caloptérygines. *Bull. Acad. r. Belg. Cl. Sci.* (2) **7** : 437–451.

—— 1869. Secondes additions au synopsis des Caloptérygines. *Bull. Acad. r. Belg. Cl. Sci.* (2) **27** : 645–680.

—— 1872. Matériaux pour une faune névroptérologique de l'Asie septentrionale. *Ann. Soc. ent. Belg.* **15** : 25–45.

—— 1873. Troisièmes additions au synopsis des Gomphines. *Bull. Acad. r. Belg. Cl. Soc.* (2) **35** : 728–774.

—— 1873*a*. Troisièmes additions au synopsis des Caloptérygines. *Bull. Acad. r. Belg. Cl. Sci.* (2) **35** : 469–519.

—— 1873*b*. Appendice au troisièmes additions au synopsis des Caloptérygines. *Bull. Acad. r. Belg. Cl. Sci.* (2) **36** : 610–619.

—— 1878. Quatrièmes additions au synopsis des Gomphines. *Bull. Acad. r. Belg. Cl. Sci.* (2) **46** : 405–511.

—— 1879. Quatrièmes additions au synopsis des Caloptérygines. *Bull. Acad. r. Belg. Cl. Sci.* (2) **47** : 349–409.

—— 1880. *Lais devillei*. *C. r. Soc. ent. Belg.* **23** : xlix–li.

—— 1883. Les Odonates du Japon. *Ann. Soc. ent. Belg.* **82** : 82–143.

—— 1894. Causeries odonatologiques. No. 7. *Ann. Soc. ent. Belg.* **38** : 163–181.

Tillyard, R. J. 1906. Descriptions of three new species of *Austrogomphus*. [Neuroptera : Odonata]. *Proc. Linn. Soc. N.S.W.* **30** : 547–554, pl. 34.

—— 1907. On the genus *Petalura*, with description of a new species. *Proc. Linn. Soc. N.S.W.* **32** : 708–718, pl. 23.

—— 1907*a*. New Australian species of the family Aeschnidae. [Neuroptera : Odonata]. *Proc. Linn. Soc. N.S.W.* **31** : 722–730, pl. 68, figs 1a–3b.

—— 1907*b*. New Australian species of the family Calopterygidae. *Proc. Linn. Soc. N.S.W.* **32** : 394–399.

TILLYARD R. J. 1908. The dragonflies of south-western Australia. *Proc. Linn. Soc. N.S.W.* **32** : 719–742.

—— 1909. On some rare Australian Gomphinae, with descriptions of new species. *Proc. Linn. Soc. N.S.W.* **34** : 238–255, pls 22–23.

—— 1912. On the genus *Diphlebia*, with descriptions of new species, and life-histories. *Proc. Linn. Soc. N.S.W.* **36** : 584–604, pls 19–20.

—— 1913. On some Australian Anisoptera, with descriptions of new species. *Proc. Linn. Soc. N.S.W.* **37** : 572–584, pl. 62.

—— 1913*a*. Some descriptions of new forms of Australian Odonata. *Proc. Linn. Soc. N.S.W.* **38** : 229–241, pl. 14.

—— 1916. Life-histories and descriptions of Australian Aeschninae: with a description of a new form of *Telephlebia* by Herbert Campion. *J. Linn. Soc.* (Zool.) **33** : 1–83, 9 pls, 4 text-figs.

—— 1917. On some new dragonflies from Australia and Tasmania [Order Odonata]. *Proc. Linn. Soc. N.S.W.* **42** : 450–479, pl. 23, 10 text-figs.

WATERHOUSE, C. O. 1877. *Proc. ent. soc. Lond.* **1877** : x.

—— 1878. Description of a new dragonfly (*Gynacantha*) from Borneo. *Trans. ent. Soc. Lond.* **1878** : 119–120, pl. 4.

WHITE, A. 1843. *In* Dieffenbach, E. *Travels in New Zealand; with contributions to the geography, geology, botany and natural history of that country.* **2**, App. : 177–296. London.

DOUGLAS ERIC KIMMINS
*Department of Entomology*
BRITISH MUSEUM (NATURAL HISTORY)
CROMWELL ROAD
LONDON, S.W.7

BRITISH MUSEUM
10 JUN 1969
NATURAL

# A LIST OF SUPPLEMENTS TO THE ENTOMOLOGICAL SERIES OF THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

---

1. Masner, L. The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Pp. 143. February, 1965. £5.
2. Nixon, G. E. J. A reclassification of the tribe Microgasterini (Hymenoptera: Braconidae). Pp. 284; 348 Text-figures. August, 1965. £6.
3. Watson, A. A revision of the Ethiopian Drepanidae (Lepidoptera). Pp. 177; 18 plates, 270 Text-figures. August, 1965. £4 4*s*.
4. Sands, W. A. A revision of the Termite Subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. Pp. 172; 500 Text-figures. October, 1965. £3 5*s*.
5. Ahmad, I. The Leptocorisinae (Heteroptera: Alydidae) of the World. Pp. 156; 475 Text-figures. November, 1965. £2 15*s*.
6. Okada, T. Diptera from Nepal. Cryptochaetidae, Diastatidae & Drosophilidae. Pp. 129; 328 Text-figures. £3.
7. Giliomee, J. H. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera : Coccoidea). Pp. 168; 43 Text-figures. February, 1967. £3 3*s*.
8. Fletcher, D. S. A revision of the Ethiopian species and a check list of the world species of *Cleora* (Lepidoptera: Geometridae). Pp. 119; 14 plates, 146 Text-figures, 9 maps. February, 1967. £3 10*s*.
9. Hemming, A. F. The Generic Names of the Butterflies and their type-species (Lepidoptera : Rhopalocera). Pp. 509. August, 1967. £8 10*s*.
10. Stempffer, H. The Genera of the African Lycaenidae (Lepidoptera : Rhopalocera). Pp. 322; 233 Text-figures. Coloured frontispiece. September, 1967. £8.
11. Mound, L. A. A review of R. S. Bagnall's Thysanoptera Collections. Pp. 184: 82 Text-figures. May, 1968. £4.
12. Watson, A. The Taxonomy of the Drepaninae represented in China, with an Account of their World Distribution (Lepidoptera : Drepanidae). Pp. 151: 293 Text-figures, 14 plates. November, 1968. £5.

13. Afifi, S. A. Morphology and Taxonomy of Adult Males of the families Pseudococcidae and Eriococcidae (Homoptera : Coccoidea). Pp. 210: 52 Text-figures. December, 1968. £5.

PRINTED IN GREAT BRITAIN BY ADLARD & SON LIMITED, BARTHOLOMEW PRESS, DORKING

BM : E

# THE FAMILY-GROUP NAMES OF THE SCALE INSECTS (HEMIPTERA : COCCOIDEA)

D. J. WILLIAMS

BRITISH MUSEUM
10 JUN 1969
NATURAL HISTORY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 8
LONDON : 1969

# THE FAMILY-GROUP NAMES OF THE SCALE INSECTS (HEMIPTERA : COCCOIDEA)

BY

DOUGLAS JOHN WILLIAMS

Commonwealth Institute of Entomology, London

*Pp.* 315-341

BRITISH MUSEUM
10 JUN 1969
NATURAL HISTORY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 23 No. 8
LONDON: 1969

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.*

*In* 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

*This paper is Vol.* 23, *No.* 8 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

*World List* abbreviation:
*Bull. Br. Mus. nat. Hist.* (Ent.).

© Trustees of the British Museum (Natural History) 1969

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

*Issued* 28 *May*, 1969 *Price Thirteen Shillings*

# THE FAMILY-GROUP NAMES OF THE SCALE INSECTS (HEMIPTERA : COCCOIDEA)

*By* D. J. WILLIAMS

## SYNOPSIS

This catalogue of family-group names of the Coccoidea contains all categories from superfamily to subtribe with their earliest date of use. It is arranged alphabetically under the type-genera of the family-group names. A separate list follows containing group names not based on nominal genera.

## INTRODUCTION

THIS work lists all family-group names in the Coccoidea with their different categories. The list, in catalogue form, is arranged alphabetically under the type-genera of the family-group names. There exist over 100 of these names based on nominal genera and in many cases their use has been quite arbitrary. It is hoped that, when proposing new group names, workers may ascertain from the list whether a name is available already, based on the nominal genus, or on a near-related genus.

The first group name formed from the genus *Coccus* was, apparently, Coccides proposed by Fallén (1814). It was not until 1868 that an attempt was made to classify the group when Targioni-Tozzetti used the tribal names Orthezites, Coccites, Lecanites and Diaspites. These tribes form the bases of the major groups today.

Scale insect classification has been based almost entirely on adult females. It is doubtful whether any but a few species can be identified from adult males. Mature females are, nevertheless, larval in form and are truly neotenic. All known males pass through two so-called pupal stages, emerging as winged or wingless adults. The winged form is the more common but most of the wingless males are degenerate and have reverted to larviform characters. These are not neotenic males in the strict sense. Maturity through pupal stages would prevent the use of this term.

The supposed loss of the pupal stages in the female has resulted in insects widely divergent in shape and size. So different is their appearance that it is remarkable how Réaumur and Linnaeus correctly placed them in the same group at such an early date. The wide difference in shape has led many recent workers to regard scale insects as forming a suborder. If adult male characters had been used from the beginning instead, then probably no category higher than a family would have been recognized for the whole group.

Special studies in cytology mainly by F. Schrader from 1921–44, S. Hughes-Schrader from 1925, S. W. Brown from 1957 and special work on symbionts by P. Buchner mainly from 1954 have helped to clarify many problems in the classification of scale insects.

Balachowsky (1942) proposed three ' phyla ', Margaroïdae, Lecanoïdae and Diaspidoïdae for the Coccoidea. Despite the choice of name, these ' phyla ' were based on the characters of three major groups of adult males. Subsequent studies of males by Theron (1958), Beardsley (1960, 1962), Ghauri (1962) and Giliomee (1967) have tended to confirm Balachowsky's classification.

Recent workers on the cytology of scale insects are also in accord with Balachowsky. Cytological studies of the group and studies of adult males are still in the pioneer stages. Nevertheless it is obvious that they will alter our concepts of the present classification. Before such changes take place, this seems a fitting time to take stock of the present family-group names and it is for this reason that the following list has been compiled. It has involved an extensive search through the literature, because many names are found in text-books and works not primarily concerned with scale insects. There may be many omissions therefore.

Coccid workers have often ignored the International Code of Zoological Nomenclature in their use of family-group names. The rules of priority pertain to these as much as to generic and specific taxa. Article 36 has rarely been followed. This applies to all categories in the family-group as being of co-ordinate status in nomenclature. Zoologists in general have usually accepted a family-group name formed from the stem of a genus. Article 13(a)(i) of the International Code of Zoological Nomenclature published in 1961 states that names proposed after 1930 should be 'accompanied by a statement that purports to give characters differentiating the taxon'. It is not clear from the 'Code' whether this ruling was definitely intended to invalidate family-group names without distinguishing characters but the ruling certainly stands. Some names published after 1930, without an indication, are accepted in this catalogue, because no ruling existed at the time of their publication.

## CATALOGUE OF FAMILY-GROUP NAMES

***ACANTHOCOCCUS*** Signoret, 1875.

ACANTHOCOCCITES Signoret, 1875*b* : 16.
ACANTHOCOCCARIA Signoret; Atkinson, 1886 : 286.
ACANTHO-COCCIDAE Signoret; Maskell, 1887 : 47.
ACANTHOCOCCIDAE Signoret; Maskell, 1887 : 88.
ACANTHOCOCCINI Signoret; Ashmead, 1891 : 95.
ACANTHOCOCCINAE Signoret; Maskell, 1894*b* : 84.

The validity of this group name depends on whether *Acanthococcus* is identical with *Eriococcus* Targioni-Tozzetti. The family name Eriococcidae, 1899 has been widely used in recent years but if Borchsenius (1948) is correct in recognizing *Acanthococcus* as distinct from *Eriococcus*, then Acanthococcites has priority over Eriococcidae. The acceptance of Acanthococcidae would also depend on whether the genus *Kermes* Boitard belongs to this group, in which case Kermesites Signoret, 1875 is available. It has page priority over Acanthococcites. Available evidence on the adult males suggests that *Kermes* may be distinct. For stability in the future it is suggested that the name Acanthococcidae be accepted.

***ACLERDA*** Signoret, 1874.

ACLERDINI Cockerell, 1905*b* : 197.
ACLERDIDAE Cockerell; Ferris, 1937 : 6.
ACLERDI Cockerell; Silvestri, 1939 : 700.
ACLERDINAE Cockerell; Balachowsky, 1942 : 43.

The family status of this group is now widely accepted, McConnell (1954) having revised the entire group. It is, apparently, a link between the family Coccidae and the family Eriococcidae but a comprehensive study is needed of the adult males.

***ANCEPASPIS*** Ferris, 1920.

ANCEPASPIDINI Borchsenius, 1965 : 366.

Ferris (1942) included the genus *Ancepaspis* in the subfamily Phoenicococcinae following Stickney (1934). Cytological studies by Brown & McKenzie (1962) showed that the genus has affinities with the Diaspididae. Borchsenius (1965) recognized the group as a tribe in the Diaspidinae, family Diaspididae.

***ANDASPIS*** MacGillivray, 1921.

ANDASPIDINA Balachowsky, 1968 : 61.

Balachowsky placed this subtribe in the tribe Lepidosaphedini. It includes *Andaspis* MacGillivray, *Caia* Williams, *Metandaspis* Williams and *Parandaspis* Balachowsky. The genera *Raoaspis* Borchsenius, *Pararaoaspis* Borchsenius and *Roonwalaspis* Borchsenius should also be included.

***ANTAKASPIS*** Mamet, 1959.

ANTAKASPIDINI Mamet, 1959*a* : 464.

Mamet proposed this name in the family Diaspididae. It comes close to the tribes Diaspidini and Odonaspidini. The group name was accepted by Borchsenius (1965) as one of six tribes within the subfamily Diaspidinae.

***ANTONINA*** Signoret, 1875.

ANTONININI Borchsenius, 1949 : 44.
ANTONININAE Borchsenius; Bodenheimer, 1952 : 318.

It is doubtful whether this group name can be accepted. The genus *Antonina* in the family Pseudococcidae is very close to *Sphaerococcus* Maskell, included in the tribe Sphaerococcini by Cockerell (1899*a*). It is also related to *Serrolecanium* Shinji, 1935, placed in Serrolecaniinae by Shinji in the same paper. Both these group names have priority over Antonini.

***AONIDIA*** Targioni-Tozzetti, 1868.

AONIDINA Balachowsky, 1948*b* : 266.
AONIDIINA Balachowsky; Borchsenius, 1965 : 373.

Balachowsky placed this subtribe in the tribe Aspidiotini, family Diaspididae. Available evidence from Dr. M. S. K. Ghauri, who studied the adult males at the request of the writer, shows that the genus *Aonidia* is related to the pupillarial parlatoriine species.

***APIOMORPHA*** Rübsaamen, 1894.

APIOMORPHINAE MacGillivray, 1921 : 45.
APIOMORPHINI MacGillivray; Handlirsch, 1925 : 1138.
APIOMORPHI MacGillivray; Silvestri, 1939 : 699.
APIOMORPHIDAE MacGillivray; Lizer y Trelles, 1939 : 176.

The group name replaced the invalid group name Brachyscelides Signoret, 1869, based on the preoccupied generic name *Brachyscelis* Schrader. *Apiomorpha* was included in the family Eriococcidae by Ferris (1957*b*) and by Hoy (1963). If this is generally accepted, the name Apiomorphinae is available within the Eriococcidae.

***ASPIDIELLA*** Leonardi, 1898.

ASPIDIELLINA Borchsenius, 1965 : 372.

This name was included by the author as a subtribe in the tribe Targionini, subfamily Aspidiotinae, family Diaspididae.

***ASPIDIOTUS*** Bouché, 1833.

ASPIDIOTI Westwood, 1840 : 444.
ASPIDIOTARIA Westwood; Atkinson, 1886 : 271.
ASPIDIOTINI Westwood; Ashmead, 1891 : 101.
ASPIDIOTINAE Westwood; Brues & Melander, 1932 : 130.
ASPIDIOTEA Westwood; Thiem & Gerneck, 1934 : 230.
ASPIDIOTINA Westwood; Balachowsky, 1948*b* : 268.
ASPIDINAE Westwood; Bodenheimer, 1952 : 327.

The importance of this group gained prominence after Ferris (1936*a*, 1937, 1937*a*) accepted it as a tribe within the family Diaspididae. With slight modifications, the group is still recognized and some recent workers have accepted it with subfamily status with tribal and subtribal categories.

***ASTEROLECANIUM*** Targioni-Tozzetti, 1868.

ASTEROLECANIINAE Cockerell, 1896*b* : 327.
ASTEROLECANIINI Cockerell; Cockerell, 1899*m* : 275.
ASTEROLECANIIDAE Cockerell; Enderlein, 1914 : 369.
ASTEROLECANI Cockerell; Silvestri, 1939 : 686.
ASTEROLECANINAE Cockerell; Balachowsky, 1948*b* : 251.
ASTEROLECANINI Cockerell; Balachowsky, 1948*b* : 256.
ASTEROLECANIDAE Cockerell; Bodenheimer, 1953 : 115.

This group is now well established and is widely recognized as having family status. A study is needed of some of its subdivisions. Borchsenius recognized the family Lecaniodiaspididae as being distinct but this needs to be verified from a study of the males.

***AUGULASPIS*** MacGillivray, 1921.

AUGULASPIDINA Borchsenius, 1965 : 366.

Borchsenius erected this subtribe within the tribe Chionaspidini, subfamily Diaspidinae, family Diaspididae.

***AUSTROTACHARDIA*** Chamberlin, 1923.

AUSTROTACHARDIINI Chamberlin, 1925 : 40.
AUSTROTACHARDININA [*sic*] Chamberlin; Balachowsky, 1950 : 9.
(A *lapsus* for AUSTROTACHARDINA).

This group is currently assigned to the family Lacciferidae.

***BEESONIA*** Green, 1926.

BEESONIDAE Ferris, 1950 : 5.
BEESONII Ferris; Ferris, 1957*b* : 67.
BEESONIIDAE Ferris; Ferris, 1957*b* : 67.

Ferris erected the family for a single genus containing but two species. He later proposed the name Beesonii as a ramus within the superfamily Coccoidea. Despite the obvious peculiarities of the genus, it probably has close affinities with the family Diaspididae on the basis of the adult males and pupillarial females.

***BRACHYSCELIS*** Schrader, 1863.

BRACHYSCELIDES Signoret, 1869*a* : 98.
BRACHYSCELIDAE Signoret; Maskell, 1879 : 189.
BRACHYSCELINAE Signoret; Comstock, 1881*a* : 427.
BRACHYSCELINES Signoret; Blanchard, 1883 : 232.
BRACHYSCELINA Signoret; Atkinson, 1886 : 268.
BRACHYSCELINI Signoret; Cockerell, 1899*m* : 275.

As the name *Brachyscelis* Schrader was preoccupied and replaced by *Apiomorpha* Rübsaamen, likewise the group name was replaced by Apiomorphinae MacGillivray.

***CALLIPAPPUS*** Guérin-Méneville, 1841.

CALLIPAPPINAE MacGillivray, 1921 : 53.
CALLIPAPPINI MacGillivray; Handlirsch, 1925 : 1136.

In his revision of the family Margarodidae, Morrison (1928) included the tribe within the subfamily Margarodinae, family Margarodidae.

***CALYCICOCCUS*** Brain, 1918.

CALYCICOCCINAE Brain, 1918 : 111.

Brain assigned this subfamily to the Coccidae of the Fernald Catalogue, without indicating its relationships. Ferris (1957*b*) suggested that it belonged to the Eriococcidae and Hoy (1963) concurred. A study is needed of the type-species *Calycicoccus merwei* Brain. In the meantime the group name is available within the family Eriococcidae.

***CALYMMATA*** O. G. Costa, 1828.

CALYMMATINAE Kirkaldy, 1904*a* : 258.

The name *Calymmata* is currently recognized as a synonym of *Coccus* Linnaeus and hence the group name must be regarded as a synonym of the family name Coccidae Fallén.

***CANCERASPIS*** Hempel, 1934.

CANCERASPIDINAE Hempel, 1934 : 140.
CANCERASPIDIDAE Hempel; Costa Lima, 1936 : 161.
CANCERASPINAE Hempel; Ferris, 1937 : 7.

Although Hempel suggested that this group was related to the family Diaspididae, it is the writer's opinion, on the basis of the first stage larva, that it probably belongs to the family Eriococcidae.

***CEROCOCCUS*** Comstock, 1882.

CEROCOCCINAE Balachowsky, 1942 : 44.
CEROCOCCINI Balachowsky; Balachowsky, 1948*b* : 256.

The genus *Cerococcus* has long been associated with the genus *Asterolecanium* and the group name is currently assigned to the family Asterolecaniidae. The adult males, however, show a close relationship to the family Eriococcidae.

***CEROPLASTES*** Gray, 1828.

CEROPLASTARIA Maskell, 1887 : 276.
CEROPLASTINAE Maskell; Bodenheimer, 1952 : 317.
CEROPLASTIINAE Maskell; Bodenheimer, 1953*a* : 93.

This group was recognized by Borchsenius (1957) as a subfamily within the family Coccidae *sensu stricto*. Giliomee (1967) after studying adult males, decided that the genus *Ceroplastes* was very close to *Coccus*, in which case the subfamily name Ceroplastinae should probably be sunk as a synonym of Coccinae of the family Coccidae.

***CHIONASPIS*** Signoret, 1869.

CHIONASPIDINAE Brues & Melander, 1932 : 130.
CHIONASPIFORMES Brues & Melander; Balachowsky, 1954*e* : 164.
CHIONASPIDINA Brues & Melander; Ghauri, 1962 : 199.
CHIONASPIDINI Brues & Melander; Borchsenius, 1965 : 364.

Ferris (1937) did not recognize this group and placed the type-genus in the tribe Diaspidini. Borchsenius (1965) recognized the subtribe Chionaspidina and tribe Chionaspidini in the subfamily Diaspidinae, family Diaspididae.

***CISSOCOCCUS*** Cockerell, 1902.

CISSOCOCCINAE Brain, 1918 : 107.

When Cockerell described the genus *Cissococcus*, he placed it in the tribe Eriococcini. Some rather poor specimens examined in the collections of the British Museum (Natural History) support the views of Ferris (1920*a*) that it has close affinities with the genus *Ceroplastes*. The group is, therefore, currently assigned to the family Coccidae but a study of fresh material is needed.

***COCCOMYTILUS*** Leonardi, 1898.

COCCOMYTILINA Borchsenius, 1965 : 365.

The author placed this subtribe in the tribe Lepidosaphidini of the subfamily Diaspidinae.

***COCCURA*** Šulc, 1908.

COCCURINI Borchsenius, 1948*a* : 954.
This tribe was assigned to the family Pseudococcidae

***COCCUS*** Linnaeus, 1758.

COCCIDES Fallén, 1814 : 23.
COCCIDAE Fallén; Samouelle, 1819 : 233.
COCCINA Fallén; Newman, 1834 : 380.
COCCITES Fallén; Newman, 1834 : 380.
COCCI Fallén; Westwood 1840 : 444.
COCCINIENS Fallén; Blanchard, 1840 : 210.
COCCINAE Fallén; Shimer, 1868 : 372.
COCCITI Fallén; Targioni-Tozzetti, 1868 : 710.
COCCINII Fallén; Chenu, 1875 : 15.
COCCINES Fallén; Blanchard, 1883 : 231.
COCCARIA Fallén; Atkinson, 1886 : 285.
COCCINI Fallén; Ashmead, 1891 : 95.
COCCIDINAE Fallén; Maskell, 1887 : 45.
COCCIDIDAE Fallén; Maskell, 1887*a* : 5.
COCCIDI Fallén; Acloque, 1897 : 407.
COCCOIDEA Fallén; Handlirsch 1903 : 738.
COCCIDA Fallén; Heymons, 1907 : 143.
COCCIDOIDES Fallén; Crampton, 1916 : 301.

COCCOPTERA Fallén; Krausse & Wolff, 1919 : 169.
COCCIDOIDEA Fallén; Ferris, *in* Chamberlin, 1923 : 163.
COCCODEA Fallén; Kiritchenko, 1928*a* : 145.
COCCIDOIDEAE Fallén; Seabra, 1930 : 269.
COCCINEA Fallén; Beier, 1938 : 2444.

It is now generally accepted that Fallén was the first to use the group name based on the nominal genus *Coccus*. Many later workers have credited the authorship to Leach but no reference has been found confirming this. Leach (1815 : 126) placed the genera *Dorthesia* and *Coccus* in the tribe Aphides of the family Aphida. He mentioned no group name formed from the genus *Coccus* and it is doubtful whether he published such a name earlier than Fallén's name in 1814.

The group name has been given many suffixes but the scale insects are currently regarded as forming the superfamily Coccoidea. The family Coccidae is restricted to those insects close to *Coccus hesperidum* L., the type-species.

***COELOSTOMIDIA*** Cockerell, 1900.

COELOSTOMIDIINAE Morrison, 1927 : 102.
COELOSTOMIDIINI Morrison; Morrison, 1927 : 102.

Morrison placed this subfamily in the family Margarodidae.

***COMSTOCKIELLA*** Cockerell, 1896.

COMSTOCKIELLINI Borchsenius, 1965 : 372.

This tribe is one of four included by Borchsenius in the subfamily Aspidiotinae, family Diaspididae. The name *Comstockiellina*, mentioned by Borchsenius (1965 : 372), is a *lapsus* for *Comstockiella*.

***CONCHASPIS*** Cockerell, 1893.

CONCHASPINAE Green, 1896*e* : 17.
CONCHASPIDINAE Green; Green, 1900*a* : 66.
CONCHASPIDIDAE Green; Brues & Melander, 1932 : 131.
CONCHASPIDAE Green; Ferris, 1937 : 6.
CONCHASPINI Green; Silvestri, 1939 : 858.

The group is now widely recognized as a distinct family. It has been completely revised by Mamet (1954*b*).

***CRYPTOCOCCUS*** Douglas, 1890.

CRYPTOCOCCIDAE Kosztarab, 1968 : 12.

The author erected this family for *Cryptococcus* Douglas, a genus widely accepted in the family Eriococcidae. It is not clear how it differs from the Eriococcidae but the name is available in this family under another category.

***CTENOCHITON*** Maskell, 1879.

CTENOCHITONINI Cockerell, 1889*n* : 16.

The adult female of the type-species, *Ctenochiton viridis* Maskell, was redescribed by Morrison & Morrison (1922). There is need for a further study of this species, together with the adult male, to determine its relationships. The group name is available within the family Coccidae.

***CYLINDROCOCCUS*** Maskell, 1892.

CYLINDROCOCCINAE MacGillivray, 1921 : 45.
CYLINDROCOCCINI MacGillivray; Handlirsch, 1925 : 1138.
CYLINDROCOCCIDAE MacGillivray; Brues & Melander, 1932 : 134.

Ferris (1957*c*) placed this genus in the family Eriococcidae and this was accepted by Hoy (1963). If this action is generally accepted, the group name is available within the family.

***DACTYLOPIUS*** O. G. Costa, 1835.

DACTYLOPITES Signoret, 1875*b* : 305.
DACTYLOPARIA Signoret; Atkinson, 1886 : 285.
DACTYLOPIDAE Signoret; Maskell, 1877*a* : 89.
DACTYLOPINA Signoret; Crawford, 1890 : 76.
DACTYLOPIINI Signoret; Ashmead, 1891 : 95.
DACTYLOPINAE Signoret; Maskell, 1894*b* : 86.
DACTYLOPIINAE Signoret; Green, 1896*e* : 17.
DACTYLOPIIDAE Signoret; Enderlein, 1914 : 370.

The type of the genus *Dactylopius*, fixed by Cockerell (1902*k* : 453, 454) as *D. coccus* Costa, the cochineal insect of commerce, is now widely accepted. It is another matter whether this is valid and a critical discussion of the situation was presented by Morrison & Morrison (1966 : 54–55). The group name has been given to a wide range of scale insects. Assuming the family-group to include *D. coccus* as type-species of *Dactylopius*, Ferris (1955*a*) used the name Dactylopiidae to include all the eriococcids which are currently placed in the family Eriococcidae. Later, Ferris (1957*b*) recognized the family Dactylopiidae as being distinct from the Eriococcidae but Hoy (1963) once again united the genus *Dactylopius* with the Eriococcidae, a very junior name. After a study is made of the adult males of *Dactylopius*, it should be possible to determine whether the genus is distinct from the Eriococcidae.

***DIASPIS*** O. G. Costa, 1828.

DIASPITES Targioni-Tozzetti, 1868 : 713.
DIASPIDES Targioni-Tozzetti; Signoret, 1868 : 835.
DIASPITI Targioni-Tozzetti; Targioni-Tozzetti, 1869 : 259.
DIASPIDAE Targioni-Tozzetti; Maskell, 1879 : 189.
DIASPINAE Targioni-Tozzetti; Comstock, 1881*a* : 427.
DIASPINES Targioni-Tozzetti; Blanchard, 1883 : 231.
DIASPINA Targioni-Tozzetti; Douglas, 1886 : 245.
DIASPIDINAE Targioni-Tozzetti; Maskell, 1889 : 102.
DIASPIDI Targioni-Tozzetti; Targioni-Tozzetti, 1892 : 188.
DIASPIDINI Targioni-Tozzetti; MacGillivray, 1921 : 241.
DIASPIDIDAE Targioni-Tozzetti; Brues & Melander, 1923 : 129.
DIASPIDOIDAE Targioni-Tozzetti; Balachowsky, 1942 : 37.
DIASPIDINA Targioni-Tozzetti; Balachowsky, 1954*e* : 18.
DIASPIFORMES Targioni-Tozzetti; Balachowsky, 1954*e* : 164.
DIASPIDOIDEA Targioni-Tozzetti; Obenberger, 1957 : 394.
DIASPIDEA Targioni-Tozzetti; Borchsenius, 1965 : 362.

This group name has been one of the most widely used in the scale insects and while no one would wish to see it disappear, neverthelesss it was published later than Lepidosaphidae Shimer. Morrison & Renk (1957 : 207) have stated ' From the collateral evidence (e.g. see Signoret 1868 : 842 et seq.), it seems certain that the Targioni " Catalogue " was issued as an independently paged separate paper in the year 1868; from the available evidence it seems definite that the serial publication occurred in February 1869 '.

While agreeing with this statement, it seems reasonable to suppose that the independently paged paper appeared in the latter half of 1868, that is if the serial publication occurred as late as February 1869. Shimer's paper is dated January 1868, hence Lepidosaphidae has priority, for the scale insects proper, over Diaspites Targioni-Tozzetti. To preserve both names it is necessary that the International Commission of Zoological Nomenclature should be asked to use their Plenary Powers to accept Lepidosaphidae as the junior name. Before this action is taken, however, it should be stated that there are problems concerning the use of *Lepidosaphes* which need to be resolved (Morrison & Morrison, 1966 : 107).

Both Obenberger and Borchsenius in recent years have elevated the group name to superfamily rank. It is not yet certain whether this will be generally accepted.

***DIMARGARODES*** Silvestri, 1938.

DIMARGARODINI Jakubski, 1965 : 85.

The author placed this tribe in the subfamily Margarodinae of the family Margarodidae.

***DROSICHA*** Walker, 1858.

DROSICHINI Morrison, 1927 : 105.

This is one of five tribes, included by Morrison (1928) in the subfamily Monophlebinae of the family Margarodidae.

***EREMOCOCCUS*** Ferris, 1919.

EREMOCOCCINAE Borchsenius, 1960*d* : 88.

Borchsenius assigned this subfamily to the family Asterolecaniidae.

***ERIOCOCCUS*** Targioni-Tozzetti, 1868.

ERIOCOCCINI Cockerell, 1899*a* : 389.
ERIOCOCCINAE Cockerell; Maxwell-Lefroy, 1909 : 758.
ERIOCOCCIDAE Cockerell; Brues & Melander, 1932 : 134.
ERIOCOCCI Cockerell; Silvestri, 1939 : 638.

In recent years the family Eriococcidae has gained wide acceptance. Its continued use must depend on whether the genus *Acanthococcus* is identical or not with *Eriococcus*, in which case Acanthococcidae would have priority. Kermidae and Dactylopiidae both have priority also and much depends on studies of the adult males of the type-species of each group. The statements by Morrison & Morrison (1966 : 69) regarding the use of *Acanthococcus* and the need for further study should be considered.

***ERIOPELTIS*** Signoret, 1872.

ERIOPELTINI Šulc, 1941 : 3.
ERIOPELTINAE Šulc; Bodenheimer, 1952 : 317.

Borchsenius (1957) placed the genus *Eriopeltis* in the subfamily Filippiinae, family Coccidae. After studying adult males, Giliomee (1967) placed the genus *Filippia* Targioni-Tozzetti in quite a different group from that of *Eriopeltis*. Although Giliomee did not mention family-group names, it is evident that the Eriopeltinae is a major group within the family Coccidae. The name must take the date of Signoretiaria Atkinson, 1886 as this group name is based on a junior homonym (Article 39(a) (i) ).

***EUMARGARODES*** Jakubski, 1950.

EUMARGARODINAE Jakubski, 1965 : 47.
EUMARGARODINI Jakubski; Jakubski, 1965 : 49.

The subfamily is one of four near-related groups assigned by Jakubski to his concept of the family Margarodidae. This family is the same in content as the tribe Margarodini of Morrison (1928).

***EURHIZOCOCCUS*** Silvestri, 1936.

EURHIZOCOCCINI Jakubski, 1965 : 172.

Jakubski placed this tribe in the subfamily Termitococcinae, family Termitococcidae.

***FILIPPIA*** Targioni-Tozzetti, 1868.

FILIPPINAE Bodenheimer, 1952 : 317.
FILIPPIINAE Bodenheimer; Bodenheimer, 1953*a* : 93.

Borchsenius (1957) recognized the group as a subfamily in the family Coccidae. Giliomee (1967) regarded the adult males of *Filippia* as being close to *Coccus* and its relatives. The group name is available, nevertheless, as a tribe or subtribe within the subfamily Coccinae.

***FIORINIA*** Targioni-Tozzetti, 1868.

FIORINIAE Leonardi, 1903 : 3.
FIORINIINI Leonardi; MacGillivray, 1921 : 241.
FIORINIINAE Leonardi; Brues & Melander, 1932 : 130.

Borchsenius (1965) recognized this group as a tribe in the subfamily Diaspidinae, family Diaspididae. All species in the group are pupillarial and there is need for a critical study of the adult males to verify Borchsenius' assignment.

***FURCASPIS*** Lindinger, 1908.

FURCASPIDINA Balachowsky, 1958 : 249.

The author assigned this subtribe to the Aspidiotini. Borchsenius (1965) placed it, together with the Pseudaonidiina, in the tribe Pseudaonidiini, subfamily Aspidiotinae, family Diaspididae.

***GYMNASPIS*** Newstead, 1898.

GYMNASPIDINA Balachowsky, 1958 : 315.

This subtribe was placed in the tribe Parlatoriini by Balachowsky, with which Borchsenius (1965) concurred.

***HALIMOCOCCUS*** Cockerell, 1902.

HALIMOCOCCIDAE Brown & McKenzie, 1962 : 168.

As a result of cytological and morphological studies of a number of pupillarial forms in the Diaspididae and Phoenicococcidae, Brown & McKenzie suggested that a new family was needed to cater for the pupillarial genera in the Phoenicococcidae. From the text there are adequate distinguishing characters to recognize the suggested name Halimococcidae, formed from the name *Halimococcus*, and the family-group name is valid. The authors stated that the family was close to the family Diaspididae.

***HOWARDIA*** Berlese & Leonardi, 1896.

HOWARDIINA Borchsenius, 1965 : 368.

This is one of four subtribes assigned by Borchsenius to the tribe Diaspidini of the family Diaspididae.

***ICERYA*** Signoret, 1875.

ICERYINI Cockerell, 1899*m* : 274.

The current assignment of the tribe was made by Morrison (1928) to the subfamily Monophlebinae, family Margarodidae.

***KERMES*** Boitard, 1828.

KERMESITES Signoret, 1875 : 15.
KERMITIDAE Signoret; Maskell, 1884 : 128.
KERMESARIA Signoret; Atkinson, 1886 : 285.
KERMESINAE Signoret; Ashmead, 1891 : 95.
KERMESINI Signoret; Ashmead, 1891 : 95.
KERMESIINAE Signoret; MacGillivray, 1921 : 45.
KERMESIDAE Signoret; Lobdell, 1929 : 762.
KERMIDAE Signoret; Ferris, 1937 : 5.
KERMINAE Signoret; Balachowsky, 1948 : 10.

The position of this group still awaits a correct assignment from a study of adult males. Balachowsky (1942, 1948*b*) linked the genus *Kermes* with the eriococcids and the pseudococcids. Ferris (1955a) included *Kermes* with the eriococcids. Borchsenius (1960*d*) recognized the name *Kermococcus* Silvestri in place of *Kermes* and accepted the family Kermococcidae for it. The writer agrees with Morrison & Morrison (1966) that *Kermococcus* is a synonym of *Kermes* and hence the name Kermococcidae is a junior synonym of Kermesites Signoret. Giliomee (1967) considered that the adult males of *Kermes* are much closer to the family Coccidae than to the eriococcids but this statement was tentative pending a thorough study of the adult males.

The word *Kermes* is not of Greek or Latin origin and the formation of a family-group name should not be inflected. If a family category is needed it should be Kermesidae.

***KERMOCOCCUS*** Silvestri, 1911.

KERMOCOCCINAE Balachowsky, 1930 : 313.
KERMOCOCCINOS Balachowsky; Gomez-Menor, 1937 : 245.
KERMOCOCCI Balachowsky; Silvestri, 1939 : 629.
KERMOCOCCIDAE Balachowsky; Borchsenius, 1950*b* : 15.

As already stated under *Kermes* the genus *Kermococcus* is a junior synonym (Morrison & Morrison, 1966) and hence Kermococcinae Balachowsky is a junior synonym of Kermesites Signoret.

***KERRIA*** Targioni-Tozzetti, 1884.

KERRIIDAE Lindinger, 1937 : 187.
KERRIINAE Lindinger; Lindinger, 1937 : 187.

Lindinger proposed this group name in place of Lacciferidae, because names in Oken (1915), in which the nominal genus *Laccifer* was described, were not consistently binominal. Later, Oken's work was invalidated by the International Commission of Zoological Nomenclature (see Morrison & Morrison, 1966 under *Laccifer*). As the Rules now stand the group name Lacciferidae is also invalid. Since *Laccifer* was presented binominally by Oken, it would be a simple matter to ask the Commission to use its Plenary Powers to validate it. On the other hand, as Kerriidae is still not widely used, the use of Tachardiidae, despite the synonymy of the nominal genus *Tachardia* Blanchard with *Kerria*, need not be precluded but this needs legal action also. As Morrison & Morrison (1966) have stated, there are now so few species involved currently placed in *Laccifer*, that the use of *Kerria* and its family name Kerriidae could easily be accepted.

***KUWANASPIS*** MacGillivray, 1921.

KUWANASPIDINA Borchsenius, 1965 : 366.

Borchsenius placed this subtribe in the tribe Chionaspidini, subfamily Diaspidinae, family Diaspididae.

***KUWANIA*** Fernald, 1903.

KUWANIINAE MacGillivray, 1921 : 45.
KUWANIINI MacGillivray; Handlirsch, 1925 : 1136.
KUWANI MacGillivray; Silvestri, 1939 : 635.

Morrison (1928) assigned the tribe Kuwaniini, along with two other tribes, to the subfamily Margarodinae, family Margarodidae. This has been widely accepted since.

Morrison and Morrison (1966) have credited Cockerell with the authorship of *Kuwania*, a name mentioned by Fernald (1903*b*). Although Cockerell was responsible for the name, he was not responsible for the conditions that made it available (Article 50).

***LACCIFER*** Oken, 1815.

LACCIFERIDAE Cockerell, 1924 : 47.
LACCIFERINAE Cockerell; Chamberlin, 1925 : 32.
LACCIFERINI Cockerell; Chamberlin, 1925 : 33.
LACCIFERI Cockerell; Chamberlin, 1925 : 33.
LACCIFERININA Cockerell; Balachowsky, 1950 : 9. (A *lapsus* for LACCIFERINA).

Cockerell proposed the family name in place of Tachardiidae because the genus *Laccifer* had priority over *Tachardia* Blanchard. A discussion on the use of Lacciferidae and its validity will be found under the genus *Kerria*.

***LECANIUM*** Burmeister, 1835.

LECANITES Targioni-Tozzetti, 1868 : 713.
LECANIDES Targioni-Tozzetti; Signoret, 1869*a* : 98.
LECANITI Targioni-Tozzetti; Targioni-Tozzetti, 1869 : 258.
LECANIDAE Targioni-Tozzetti; Maskell, 1879 : 189.
LECANIEAE Targioni-Tozzetti; Maskell, 1879 : 205.
LECANINAE Targioni-Tozzetti; Comstock, 1881*a* : 427.
LECANINES Targioni-Tozzetti; Blanchard, 1883 : 231.
LECANINA Targioni-Tozzetti; Atkinson, 1886 : 268.
LECANIARIA Targioni-Tozzetti; Atkinson, 1886 : 277.
LECANIDINAE Targioni-Tozzetti; Maskell, 1887 : 46.
LECANIINI Targioni-Tozzetti; Ashmead, 1891 : 98.
LECANIINAE Targioni-Tozzetti; Cockerell, 1896*b* : 329.
LECANIIDAE Targioni-Tozzetti; Cockerell, 1929 : 150.
LECANOIDAE Targioni-Tozzetti; Balachowsky, 1942 : 37.
LECANINI Targioni-Tozzetti; Balachowsky, 1948*b* : 255.
LECANIOIDEA Targioni-Tozzetti; Obenberger, 1957 : 388.

This group name has been in continual use to the present day, despite acceptance that the nominal genus has the same type-species as the genus *Coccus* as used in the Fernald Catalogue, 1903. The family-group name Lecanites Targioni-Tozzetti is a junior synonym of Coccides Fallén, 1814 and should not be used.

***LECANODIASPIS*** Targioni-Tozzetti, 1869.

LECANODIASPITES Targioni-Tozzetti, 1869 : 260.
LECANIODIASPIDAE Targioni-Tozzetti; Maskell, 1879 : 205.
LECANODIASPARIA Targioni-Tozzetti; Atkinson, 1886 : 276.
LECANIODIASPINI Targioni-Tozzetti; Ashmead, 1891 : 98.
LECANODIASPINI Targioni-Tozzetti; Targioni-Tozzetti, 1893 : 302.
LECANIODIASPIDIDAE Targioni-Tozzetti; Borchsenius, 1959 : 840.

This group has been widely accepted as belonging to the family Asterolecaniidae. Borchsenius (1959) regarded Lecanodiaspididae as a distinct family. It is not yet certain whether this is correct, even after a study of the adult males of an *Asterolecanium* by Munting & Giliomee (1967) and of *Lecanodiaspis* by Giliomee & Munting (1968). If *Lecanodiaspis* is not distinct, then the family-group name Lecanodiaspididae should be accepted in place of Asterolecaniidae on the grounds of priority.

***LEPIDOSAPHES*** Shimer, 1868.

LEPIDOSAPHIDAE Shimer, 1868 : 372.
LEPIDOSAPHIDES Shimer; Silvestri, 1911 : 169.
LEPIDOSAPHINI Shimer; Lizer y Trelles, 1919 : 44 (reprint).
LEPIDOSAPHINAE Shimer; Brues & Melander, 1932 : 130.
LEPIDOSAPHEDINA Shimer; Balachowsky, 1954*e* : 19.
LEPIDOSAPHIDINI Shimer; Borchsenius, 1965 : 363.

This group has not gained acceptance as a distinct family but the nominate tribe and subtribe have been used in recent years. There are problems of priority concerning the genus *Mytilococcus* Amerling which still need to be resolved (Morrison & Morrison, 1967 : 107) and even acceptance of the type-species of *Lepidosaphes* needs further study. As stated already under *Diaspis* there is also the problem that the name Lepidosaphidae was published before Diaspites of Targioni-Tozzetti, in which case, if the Law of Priority is observed, then Lepidosaphidae should be used for all the scale insects proper now included in the family Diaspididae. To preserve both names, it is only necessary for Lepidosaphidae to be made the junior name under the Plenary Powers of the International Commission of Zoological Nomenclature. Even if *Mytilococcus* is accepted, then Shimer's group name can still be used in one or more categories. There is no need to accept the group name based on Mytilococci Silvestri, because there is still the name Mytilaspides of Leonardi having priority. The genus *Mytilaspis* has been resurrected and will probably gain acceptance. Since Borchsenius' work on the group, there are now few species remaining in the genus *Lepidosaphes* and any change in the generic and even the group name would not be too drastic. Borchsenius (1965) has recently accepted the subtribe Lepidosaphidina in the tribe Lepidosaphidini, subfamily Diaspidinae, family Diaspididae.

***LEUCASPIS*** Targioni-Tozzetti, 1868.

LEUCASPIARIA Atkinson, 1886 : 271.
LEUCASPINI Atkinson; Ashmead, 1891 : 101.
LEUCASPIDES Atkinson; Leonardi, 1897 : 283.
LEUCASPIDINI Atkinson; MacGillivray, 1921 : 241.
LEUCASPIDINAE Atkinson; Brues & Melander, 1932 : 131.
LEUCASPIDINA Atkinson; Balachowsky, 1948*b* : 261.

This is another group name with some confusion over the type-genus. The problem has been discussed recently by Morrison & Morrison (1966 : 108, 109) and the main concern is whether *Leucaspis* Burmeister, 1835 used in the Hymenoptera is an invalid or valid emendation of *Leucopsis* Fabricius or whether *Leucaspis* Burmeister is a zoological name in the strict sense. If the latter is correct, then *Leucaspis* Targioni-Tozzetti, 1868 is a junior homonym and its replacement by *Leucodiaspis* Signoret should be accepted. Most present workers agree that *Leucaspis* Burmeister is invalid and continue to use *Leucaspis* Targioni-Tozzetti, 1868 with the corresponding group name. Should there be a problem and if it is desired to retain the name *Leucaspis* and hence the group name, then application must be made to the International Commission of Zoological Nomenclature.

Borchsenius (1965) accepted the group as a tribe within the subfamily Parlatoriinae, family Diaspididae.

***LEUCODIASPIS*** Signoret, 1869.

LEUCODIASPIDINA Zahradník, 1952 : 95.
LEUCODIASPIDINAE Zahradník; Zahradník, 1952 : 99.
LEUCODIASPIDINI Zahradník; Obenberger, 1957 : 422.

As stated under *Leucaspis*, the name *Leucodiaspis* should only be used if *Leucaspis* Targioni-Tozzetti, 1868 is a junior homonym of *Leucaspis* Burmeister, 1835.

***LLAVEIA*** Signoret, 1876.

LLAVEIINI Morrison, 1927 : 106.

Morrison (1928) assigned this tribe to the subfamily Monophlebinae, Margarodidae.

***MARCHALINA*** Vayssière, 1923.

MARCHALININI Morrison, 1927 : 102.
MARCHALINI Morrison; Silvestri, 1939 : 647.

The generally accepted position of this group was made by Morrison (1928), who included the tribe in the subfamily Coelostomidiinae, family Margarodidae.

***MARGARODES*** Guilding, 1829.

MARGARODINAE Cockerell, 1899*a* : 390.
MARGARODINI Cockerell; Cockerell, 1899*h* : 416.
MARGARODIDAE Cockerell; Enderlein, 1914 : 370.
MARGARODINA Cockerell; Šulc, 1936 : 64.
MARGARODI Cockerell; Silvestri, 1939 : 637.
MARGAROIDAE Cockerell; Balachowsky, 1942 : 37.
MARGARODIDEA Cockerell; Bodenheimer, 1949 : 7.
MARGARODININAE Cockerell; Bodenheimer, 1952 : 318.
MARGARODOIDEA Cockerell; Obenberger, 1957 : 387.

The family name has been used in the literature recently to contain all the names of genera whose species possess abdominal spiracles but lack a setigerous anal ring. Both the nominate subfamily and tribe are in use today. Morrison (1928) confined the tribe to those genera near *Margarodes* possessing fossorial front legs and whose intermediate stages are in the form of ground pearls. Jakubski (1965) elevated this tribe to full family rank without taking into consideration the large number of subfamilies and tribes already recognized under the family Margarodidae.

The name of the family is junior to three other names; Porphyrophorites Signoret, 1875, Monophlebites Signoret, 1875 and Xylococcinae Pergande, 1898. The generic name *Porphyrophora* Brandt, 1833 was for a long time regarded as a synonym of *Margarodes* but the two genera are now accepted as being distinct. As Porphyrophorites Signoret has page precedence over Monophlebites, then the family name Porphyrophoridae should be used now for stability, together with the nominate subfamily and tribe.

The only other problem concerning the use of *Porphyrophora* is whether *Coccionella* Hahnemann has priority; a matter discussed recently by Morrison & Morrison (1966).

***MATSUCOCCUS*** Cockerell, 1909.

MATSUCOCCINI Morrison, 1927 : 101.

Morrison (1928) assigned this tribe to the subfamily Xylococcinae, family Margarodidae.

***MELANASPIS*** Cockerell, 1897.

MELANASPIDINA Borchsenius, 1965 : 372.

This subtribe was placed by the author in the tribe Aspidiotini, subfamily Aspidiotinae, family Diaspididae.

***MICROCOCCUS*** Leonardi, 1907.

MICROCOCCI Silvestri, 1939 : 702.
MICROCOCCINAE Silvestri; Balachowsky, 1942 : 43.
MICROCOCCINI Silvestri; Balachowsky, 1948*b* : 255.

Silvestri placed the subtribe Micrococci in the tribe Pseudococcini. Ferris (1957*b*) considered that the characters of *Micrococcus* were eriococcid and included the genus in the family Eriococcidae. Hoy (1963) agreed with this action. No critical study has yet been made of the adult male. The group name is, nevertheless, available within the family Eriococcidae.

***MONOPHLEBULUS*** Cockerell, 1902.

MONOPHLEBULINI Morrison, 1927 : 106.

The author assigned this tribe to the subfamily Monophlebinae, family Margarodidae.

***MONOPHLEBUS*** Guérin-Méneville, 1827.

MONOPHLEBITES Signoret, 1875 : 350.
MONOPHLEBIDAE Signoret; Maskell, 1880 : 294.
MONOPHLEBARIA Signoret; Atkinson, 1886 : 292.
MONOPHLEBINAE Signoret; Ashmead, 1891 : 93.
MONOPHLAEBINAE Signoret; Berlese & Leonardi, 1898*a* : 285.
MONOPHLEBINI Signoret; Cockerell, 1899*m* : 274.
MONOPHLEBIINAE Signoret; Obenberger, 1957 : 398.

This group name has now gained wide acceptance as a subfamily within the family Margarodidae and most workers have followed the classification of Morrison (1928). As already stated under *Margarodes*, the group names Porphyrophorites Signoret and Monophlebites Signoret have priority over Margarodinae Cockerell. The subfamily Monophlebinae should therefore be included in the family Porphyrophoridae.

***MYTILASPIS*** Targioni-Tozzetti, 1868.

MYTILASPIDES Leonardi, 1897 : 283.
MYTILASPINI Leonardi; Šulc, 1912 : 8.

For many years the name *Mytilaspis* has been a synonym of *Lepidosaphes* and hence Leonardi's group name has been forgotten. Borchsenius (1963) has once more recognized the genus *Mytilaspis* and if there are problems concerning the genus *Mytilococcus* having priority over *Lepidosaphes*, then the group name Mytilaspides is available in place of Mytilococci Silvestri.

***MYTILOCOCCUS*** Amerling, 1858.

MYTILOCOCCI Silvestri, 1939 : 773.
MYTILOCOCCINI Silvestri; Bodenheimer, 1949 : 27.
MYTILOCOCCINA Silvestri; Zahradník, 1952 : 95.
MYTILOCOCCINAE Silvestri; Obenberger, 1957 : 423.

As stated in the previous genus, even if *Mytilococcus* is accepted as having priority over *Lepidosaphes* Shimer, then Mytilaspides Leonardi still has priority over Silvestri's group Mytilococci.

***NEOMARGARODES*** Green, 1914.

NEOMARGARODINAE Jakubski, 1965 : 54.
NEOMARGARODINI Jakubski; Jakubski, 1965 : 57.

The author assigned the subfamily to the family Margarodidae. Compared with other subfamilies at present accepted within the Margarodidae, Neomargarodinae seems to be too high a rank to accept.

***ODONASPIS*** Leonardi, 1897.

ODONASPIDINI Ferris, 1937 : 7.
ODONASPIDES Ferris; Silvestri, 1939 : 773.
ODONASPIDINAE Ferris; Balachowsky, 1942 : 47.

Ferris originally assigned the tribe to the subfamily Diaspidinae, family Diaspididae. The latest interpretation is by Borchsenius (1965*b*), who accepted the group with subfamily status in the family Diaspididae.

***ORTHEZIA*** Bosc d'Antic, 1784.

ORTHEZIDES Amyot & Serville, 1843 : 619.
ORTHEZITES Amyot & Serville; Targioni-Tozzetti, 1868 : 713.
ORTHEZITI Amyot & Serville; Targioni-Tozzetti, 1869 : 258.
ORTHEZIINAE Amyot & Serville; Cockerell, 1896*b* : 327.
ORTHEZINAE Amyot & Serville; Berlese and Leonardi, 1898*a* : 285.
ORTHEZIIDAE Amyot & Serville; Enderlein, 1914 : 369.
ORTHEZIINI Amyot & Serville; Silvestri, 1939 : 629.
ORTHEZIOIDEA Amyot & Serville; Chou, 1963 : 592.

This group is now accepted as one of the major families of the Coccoidea and distinct from the family Margarodidae. Various workers have linked both groups into a higher taxon. Chou, using the oldest name, has recognized a superfamily containing both the Margarodidae and Ortheziidae. There is obviously a relationship between the two families but there have been no critical studies of the adult males which would clarify the position. The family has been revised by Morrison (1925, 1952).

***PALAEOCOCCUS*** Cockerell, 1894.

PALAEOCOCCINAE Heymons, 1915 : 183.

It is clear from the text and from the index on pp. XVI–XVII that Heymons based the group name on the nominal genus *Palaeococcus* to include also the genus *Orthezia*. Heymons also recognized the subfamilies Monophlebinae and Margarodinae. It is not clear why this action was taken. Morrison (1928) placed *Palaeococcus* in the tribe Monophlebini, subfamily Monophlebinae and in the present system of classification, Palaeococcinae would fall as a synonym of Monophlebinae.

***PARALECANIUM*** Cockerell, 1899.

PARALECANIINI **trib. n.**

Belonging to the subfamily Coccinae, family Coccidae. The tribe contains at least four genera all of which differ from other genera in possessing a pair of eye spots on the dorsal surface of the head situated some distance from the margin and often directly opposite the antennal bases. In addition the stigmatic clefts are noticeably sunken and well sclerotized.

At present, apart from *Paralecanium*, the tribe also contains the following genera: *Platylecanium* Cockerell & Robinson, 1915, *Neoplatylecanium* Takahashi, 1929 and *Marsipococcus* Cockerell & Bueker, 1930.

***PARLATOREOPSIS*** Lindinger, 1912.

PARLATOREOPSIDINA Borchsenius, 1965 : 370.

Borchsenius placed this subtribe in the tribe Parlatoriini, subfamily Parlatoriinae, family Diaspididae.

***PARLATORIA*** Tergioni-Tozzetti, 1868.

PARLATORIAE Leonardi, 1897 : 283.
PARLATOREAE Leonardi; Lindinger, 1908 : 97.
PARLATORINI Leonardi; Lizer y Trelles, 1919 : 44.
PARLATORIINI Leonardi; MacGillivray, 1921 : 241.
PARLATORIINAE Leonardi; Brues & Melander, 1932 : 131.
PARLATORINA Leonardi; Balachowsky, 1948*b* : 261.
PARLATORIINA Leonardi; Borchsenius, 1965 : 370.

This group was not recognized by Ferris (1936*a*, 1937) or in any of his later works on the Diaspididae. Balachowsky (1948*b*) recognized both tribal and subtribal categories and these have been accepted by other workers. Since McKenzie & Nelson-Rees (1962) studied the cytology and Ghauri (1962) the adult males most workers recognize the group as being of major importance. Apart from the nominate subtribe, Borchsenius recognized two other subtribes in the Parlatoriini which, together with the Leucaspidini, form the subfamily Parlatoriinae in the family Diaspididae.

***PHENACASPIS*** Cooley & Cockerell, 1899.

PHENACASPIDINA Borchsenius, 1965 : 366.

This subtribe was placed by the author in the tribe Chionaspidini, subfamily Diaspidinae, family Diaspididae.

***PHENACOCCUS*** Cockerell, 1893.

PHENACOCCINAE Šulc, 1944 : 152.
PHENACOCCINI Šulc; Borchsenius, 1962*a* : 232.

Šulc used the subfamily name in place of Dactylopiinae of Fernald (1903*b*) and the Pseudococcinae of Silvestri (1911). Borchsenius placed the group in the Pseudococcidae.

***PHENACOLEACHIA*** Cockerell, 1899.

PHENACOLEACHIINAE Cockerell, 1902*q* : 260.
PHENACOLEACHIINI Cockerell; Handlirsch, 1925 : 1137.
PHENACOLEACHIIDAE Cockerell; Brues & Melander, 1932 : 132.
PHENACOLEACHIDAE Cockerell; Balachowsky, 1942 : 38.

PHENACOLEACHINAE Cockerell; Balachowsky, 1948*b* : 251.
PHAENACOLEACHIIDAE Cockerell; Obenberger, 1957 : 389.

The exact relationship of the genus has been a problem since it was described. Theron (1962) made a comprehensive study of the adult male and concluded that it has some relationship with *Steingelia* Nassanov, a genus placed doubtfully in the Margarodidae. The position of the family-group name will be discussed further under *Steingelia*.

***PHOENICOCOCCUS*** Cockerell, 1899.

PHOENICOCOCCINAE Stickney, 1934 : 26.
PHOENICOCOCCINI Stickney; Stickney, 1934 : 26.
PHOENICOCOCCI Stickney; Silvestri, 1939 : 706.
PHOENICOCOCCIDAE Stickney; Balachowsky, 1942 : 39.

Stickney studied the type-genus in great detail and erected the subfamily for it. He also included within the group a number of pupillarial genera centred around *Halimococcus*. The subfamily was assigned to the family Diaspididae. McKenzie & Nelson-Rees (1962) studied the cytology and dissociated *Phoenicococcus* from the other genera, for which they erected the family Halimococcidae. The authors stated that the genus *Xanthophthalma* Cockerell & Parrott was closely related to *Phoenicococcus*. Brown (1965) concurred with these results. In recent years some authors have regarded the family Phoenicococcidae as being distinct from the family Diaspididae. There is reason to believe that the family Halimococcidae should be accepted but the problem is where to place *Phoenicococcus* and its nominate subfamily together with the genus *Xanthophthalma* and its nominate subfamily. The adult males of *Phoenicococcus* described by Stickney are degenerate but seem to be quite distinct from those of the pupillarial genera herein accepted in the Halimococcidae. They approach the males of *Pseudochermes* Nitsche now placed in the Eriococcidae. Despite the views of Stickney and subsequent authors, the writer believes that *Phoenicococcus* and *Xanthophthalma* should be studied further in connection with the family Eriococcidae.

***PHYSOKERMES*** Targioni-Tozzetti, 1868.

PHYSOKERMINI Šulc, 1912 : 6.

Šulc placed this tribe in the subfamily Coccinae.

***PITYOCOCCUS*** McKenzie, 1942.

PITYOCOCCINI McKenzie, 1942 : 2.

The author assigned this tribe to the subfamily Coelostomidiinae, family Margarodidae.

***PLANOCOCCUS*** Ferris, 1950.

PLANOCOCCINI Ezzat & McConnell, 156 : 3.

The authors placed this tribe in the family Pseudococcidae.

***PLATYCOELOSTOMA*** Morrison, 1923.

PLATYCOELOSTOMINI Morrison, 1927 : 102.

This tribe was assigned to the subfamily Coelostomidiinae, family Margarodidae.

***POLLINIA*** Targioni-Tozzetti, 1868.

POLLINIINI Borchsenius, 1960 : 90.

Borchsenius placed this tribe in the subfamily Cerococcinae, family Asterolecaniidae. It certainly seems to belong to this subfamily but, as suggested under *Cerococcus*, the group has close affinities with the family Eriococcidae on the basis of the adult males.

***PORPHYROPHORA*** Brandt, 1833.

PORPHYROPHORITES Signoret, 1875*b* : 346.
PORPHYROPHORIDAE Signoret; Maskell, 1887*a* : 91.
PORPHYROPHORINAE Signoret; Cockerell, 1896*b* : 323.
PORPHYROPHORINI Signoret; Jakubski, 1965 : 5.

As stated under the genus *Margarodes*, this name is the earliest to be used for the group currently known as the Margarodidae. As the genus *Porphyrophora* is accepted by a number of workers, for stability in the future, the family name Porphyrophoridae should be used on the grounds of priority. There is a problem, nevertheless, concerning *Coccionella* Hahnemann and its priority over *Porphyrophora* discussed recently by Morrison & Morrison (1966).

***PSEUDAONIDIA*** Cockerell, 1897.

PSEUDOAONIDINA Balachowsky, 1948*b* : 266.
PSEUDAONIDINA Balachowsky; Balachowsky, 1951 : 675.
PSEUDAONIDIINI Balachowsky; Borchsenius, 1965 : 372.
PSEUDAONIDIINA Balachowsky; Borchsenius, 1965 : 372.

The author assigned this subtribe to the tribe Aspidiotini. Borchsenius (1965), in a slightly different arrangement, placed the subtribe Pseudaonidina in the tribe Pseudaonidiini, subfamily Aspidiotinae, family Diaspididae.

***PSEUDOCOCCUS*** Westwood, 1840.

PSEUDOCOCCINI Cockerell, 1905*b* : 193.
PSEUDOCOCCINAE Cockerell; Silvestri, 1911 : 132.
PSEUDOCOCCIDAE Cockerell; Lobdell, 1930 : 209.
PSEUDOCOCCI Cockerell; Silvestri, 1939 : 666.
PSEUDOCOCCOIDEA Cockerell; Chou, 1963 : 592.

The views of Morrison & Morrison (1966) concerning the validity of the genus should be studied in great detail. The family-group name has now become widely accepted for the mealybugs and coccidologists would feel any change here undesirable. Nevertheless, if *Pseudococcus* and the nominate group names are to be retained, then some form of application is needed to the International Commission of Zoological Nomenclature.

Most workers now recognize the Pseudococcidae as a family with a few subcategories. No serious attempt has been made to classify the family and the limits of the subfamilies and tribes remain obscure.

***PULVINARIA*** Targioni-Tozzetti, 1866.

PULVINATI Targioni-Tozzetti, 1868 : 727.
PULVINARIEAE Targioni-Tozzetti; Maskell, 1879 : 205.
PULVINARIARIA Targioni-Tozzetti; Atkinson, 1886 : 277.
PULVINARIINI Targioni-Tozzetti; Ashmead, 1891 : 98.

The group name had not been widely used until Borchsenius (1957) published a classification of the Coccidae of the USSR. He accepted tribal status and, together with the tribe Coccini, placed them in the subfamily Coccinae, family Coccidae. Giliomee (1967) studied the adult males and confirmed that *Pulvinaria* is close to *Coccus*. Both probably belong to the same family-group.

***RHIZOECUS*** Künckel d'Herculais, 1878.

RHIZOECINI **trib. n.**

Belonging to the family Pseudococcidae. Usually very small mealybugs with one or more of the following combinations of characters: Cerarii absent or confined to anal lobes, each with a pair of long setae. Body setae minute, often numerous and often forming distinct groups. Antennae with bases close together and noticeably geniculate, with not more than six segments. Often with special bi- or tritubular pores peculiar to the group. Anal ring with large oval pores. Claws long and slender.

The group contains hypogeic and myrmecophilous mealybugs. A study of the group was made by Hambleton (1946). Beardsley (1962) has studied adult males of the type-species *Rhizoecus falcifer* Künckel d'Herculais. He considered them the most primitive of the mealybug males, the head not separated from the thorax by the usual constricted neck region. The structure of the penial sheath links the group to the *Phenacoccus* group of genera. Known males of *Pseudorhizoecus* studied by Green (1933) are degenerate.

Apart from the type-genus *Rhizoecus*, the tribe contains the following genera: *Geococcus* Green, *Pseudorhizoecus* Green, *Radiococcus* Hambleton, *Ripersiella* Tinsley, *Brevicoccus* Hambleton, *Neorhizoecus* Hambleton, *Eumyrmococcus* Silvestri and *Pygmaeococcus* McKenzie.

***RUGASPIDIOTUS*** MacGillivray, 1921.

RUGASPIDIOTINA Balachowsky, 1949 : 109.

Balachowsky (1953*g*) placed this subtribe in the tribe Odonaspidini. Borchsenius (1965) recognized the subtribe but transferred it to the tribe Diaspidini. Ghauri (1962) considered that the group was distinct from the Diaspidini after studying adult males of *Rugaspidiotus tamaricicola* (Malenotti).

***SCLOPETASPIS*** MacGillivray, 1921.

SCLOPETASPIDINA Borchsenius, 1965 : 366.

The author placed this subtribe in the tribe Chionaspidini, subfamily Diaspidinae, family Diaspididae.

***SELENASPIDUS*** Cockerell, 1897.

SELENASPIDINA Balachowsky, 1948*b* : 266.

Balachowsky assigned this subtribe to the tribe Aspidiotini, subfamily Diaspidinae, family Diaspididae. Borchsenius (1965) agreed with this assignment but placed the Aspidiotini in the subfamily Aspidiotinae, family Diaspididae.

***SERROLECANIUM*** Shinji, 1935.

SERROLECANINIINAE Shinji, 1935 : 106. (A lapsus for SERROLECANIINAE).

As stated under *Antonina* the name has priority over Antoninini Borchsenius but is junior to Sphaerococcini Cockerell. It is, nevertheless, available should Sphaerococcini be subdivided.

***SIGNORETIA*** Targioni-Tozzetti, 1868.

SIGNORETIARIA Atkinson, 1886 : 276.
SIGNORETIINI Atkinson; Ashmead, 1891 : 98.

The name *Signoretia* Targioni-Tozzetti is a junior homonym and hence the nominate group name is invalid. Although the generic name was replaced by *Luzulaspis* Cockerell, there is no need for a new group name formed from the genus *Luzulaspis* because the genus belongs to the group Eriopeltini Šulc, 1941. Giliomee (1967) has studied the relationship of the adult males.

***SPHAEROCOCCUS*** Maskell, 1892.

SPHAEROCOCCINI Cockerell, 1899*a* : 389.

The type-species *Sphaerococcus casuarinae* Maskell is very closely related to species of *Antonina*. The tribe Sphaerococcini has priority over Antoninini and over the group name Serrolecaniinae. Both latter names are available as subgroups if necessary.

***STEINGELIA*** Nassanov, 1908.

STEINGELIINAE Morrison, 1927 : 101.
STEINGELIINI Morrison; Morrison, 1927 : 101.

Morrison (1927, 1928) assigned the subfamily to the Margarodidae. Theron (1958) studied the adult male and showed that it was an aberrant form and was probably a connecting link between Balachowsky's Margaroidae and Lecanoidae. The males of *Phenacoleachia* were shown by Theron (1962) to have close affinities with those of *Steingelia*. It seems possible that these genera should be included in the same family for which Phenacoleachiidae has priority. The subfamily name Steingeliinae is also available within the family. The American species of *Puto*, of which the males of *P. yuccae* (Coquillett) have been studied by Beardsley (1962), may also belong to this group but this needs further study.

***STICTOCOCCUS*** Cockerell, 1905.

STICTOCOCCINAE Lindinger, 1913 : 63.
STICTOCOCCI Lindinger; Silvestri, 1939 : 704.
STICTOCOCCIDAE Lindinger; Balachowsky, 1942 : 38.

Balachowsky (1942) included this group in the ' phylum ' Lecanoidae. Ferris (1957*b*) did not assign the genus to any of the families or rami he discussed, but left it as one of four unplaced genera needing further research. The adult males would certainly place the genus in Balachowsky's Lecanoidae but a thorough study is needed to determine its closest affinities.

***STIGMACOCCUS*** Hempel, 1900.

STIGMACOCCINI Morrison, 1927 : 100.

The author placed this tribe in the subfamily Xylococcinae, family Margarodidae.

***TACHARDIA*** Blanchard, 1886.

TACHARDIINAE Green, 1896 : 17.
TACHARDIIDAE Green; Ferris *in* Chamberlin, 1923 : 163.
TACHARDIINI Green; Chamberlin, 1923 : 163.

Cockerell (1924) proposed the family name Lacciferidae for this group because the name *Tachardia* was shown to be a synonym of *Laccifer* Oken. Lindinger (1937) proposed the name Kerriidae in place of Lacciferidae because *Laccifer* was regarded as invalid.

***TACHARDIELLA*** Cockerell, 1901.

TACHARDIELLI Chamberlin, 1925 : 39

The author assigned this subtribe to the tribe Lacciferini. In accordance with modern custom the writer proposes the spelling Tachardiellina.

***TACHARDINA*** Cockerell, 1901.

TACHARDININI Chamberlin, 1923 : 199.
TACHARDININAE Chamberlin; Chamberlin, 1925 : 40.
TACHARDININA Chamberlin; Balachowsky, 1950 : 9.

Chamberlin (1925) placed the subfamily and tribe in the family Lacciferidae. Balachowsky (1950) recognized a subtribe for two known genera and a new genus *Paratachardina*.

***TARGIONIA*** Signoret, 1869.

TARGIONINA Balachowsky, 1948*b* : 266.
TARGIONIINI Balachowsky; Borchsenius, 1965 : 372.
TARGIONIINA Balachowsky; Borchsenius, 1965 : 372.

Balachowsky assigned the subtribe to the tribe Aspidiotini, subfamily Diaspidinae, family Diaspididae. Borchsenius (1965), in a new classification of the Diaspididae, placed the subtribe in the tribe Targioniini, subfamily Aspidiotinae.

***TERMITOCOCCUS*** Silvestri, 1901.

TERMITOCOCCIDAE Jakubski, 1965 : 167.
TERMITOCOCCINAE Jakubski; Jakubski, 1965 : 168.
TERMITOCOCCINI Jakubski; Jakubski, 1965 : 168.

Silvestri (1936) showed that the genus has close affinities with *Margarodes* and, together with a new genus *Eurhizococcus*, placed them in the family Margarodidae. Jakubski has elevated the group to a much higher category than it warrants.

***TRABUTINA*** Marchal, 1904.

TRABUTINI Silvestri, 1939 : 60.
TRABUTININAE Silvestri; Bodenheimer, 1949 : 7.

Although Silvestri assigned the subtribe Trabutini to the tribe Pseudococcini he did not associate the genus with the mealybugs proper. Bodenheimer (1949) placed the subfamily in the Eriococcidae and regarded the group as equal in rank to the Pseudococcinae. Ferris (1950*b*) associated *Trabutina* with the genera *Nipaecoccus* Šulc, *Naiacoccus* Green and *Amonostherium* Morrison, the so-called blue-black mealybugs. The group name is, therefore, available for these genera.

***XANTHOPHTHALMA*** Cockerell & Parrott, 1899.

XANTHOPHTHALMINI Ferris, 1937 : 7.
XANTHOPHTHALMINAE Ferris; Balachowsky, 1942 : 47.

Ferris placed the tribe in the subfamily Diaspidinae, family Diaspididae. Borchsenius (1965) considered the group as having subfamily status within the Diaspididae. McKenzie & Nelson-Rees (1962) in their cytological studies, stated that it had some relationship with the genus *Phoenicococcus*. As already mentioned under the latter name, the two groups may have affinities with the Eriococcidae.

***XEROPHILASPIS*** Cockerell, 1897.

XEROPHILASPIDINA Borchsenius, 1965 : 368.

This subtribe was placed by its author in the tribe Diaspidini, subfamily Diaspidinae, family Diaspididae.

***XYLOCOCCUS*** Löw, 1883.

XYLOCOCCINAE Pergande, *in* Hubbard & Pergande, 1898 : 26.
XYLOCOCCINI Pergande; Cockerell, 1899*m* : 275.
XYLOCOCCI Pergande; Silvestri, 1939 : 634.
XYLOCOCCIDAE Pergande; Zahradník, 1959*a* : 527.

Morrison (1928) accepted both the tribe and subfamily ranks in the family Margarodidae. Zahradník elevated the group to a family of equal rank to the Margarodidae and Monophlebidae. The group name has priority over Margarodidae.

## GROUP NAMES NOT BASED ON NOMINAL GENERA

The following names have been used from time to time for groups containing either all or part of the scale insects. Some names used for family and lower categories are invalid because they are not based on nominal genera. Other names used for categories higher than a superfamily may not necessarily be invalid but are also listed here for completeness.

ANASPIDIOTI Thiem & Gerneck, 1934 : 230. There is no connection between this name and *Anaspidiotus* Borchsenius and Williams, 1963.
APETALASPIDIOTINA Thiem & Gerneck, 1934 : 230.
APTERA Leunis, 1860 : 653.
ARCHAEOCOCCIDEA Bodenheimer, 1952 : 317.
CECIDURGIDAE Schrader, 1863 : 191.
COCCIDOMORPHA Heslop-Harrison, 1952 : 688.
COCCOMORPHA Chou, 1963 : 592.
CRYPTO-KERMITIDAE Maskell, 1884 : 128.
CRYPTOKERMITIDAE Maskell, 1887*a* : 87. This name was not formed from a genus. It has no standing despite the later appearance of *Cryptokermes* Hempel, 1900.
GALLINSECTA Latreille, 1802 : 265.
HEMI-COCCIDAE Maskell, 1884 : 128.
HEMICOCCIDINAE Maskell, 1887*a* : 38.
HEMICOCCINAE Green, 1896*e* : 314.
HEMICOCOCCINAE Maskell, 1897 : 314.
HAEMICOCCINAE Silvestri, 1901 : 132.
HEMICOCCIDAE Enderlein, 1914 : 369.
HYMENELYTRA Latreille, 1825 : 428.
IDIOCOCCIDAE Maskell, 1893*b* : 236. This name has no connection with the genus *Idiococcus* Takahashi & Kanda, 1939.
IDIOCOCCINAE Maskell, 1894*b* : 329.
LANINSECTA Amyot & Serville, 1843 : 613.
LECANO-COCCIDAE Maskell, 1882 : 223.
LECANIO-COCCIDAE Maskell, 1884 : 128.
LECANOCOCCINAE Maskell, 1897 : 314.
METASPIDIOTI Theim & Gerneck, 1934 : 230. Takagi's genus *Metaspidiotus*, 1957, has no connection with this name.
MICROHOMOPTERA Crampton, 1916 : 301.
MONOMERA Westwood, 1840 : 444.
MONOPTERA Lindinger, 1927 : 366.
NEOCOCCIDAE Bodenheimer, 1943 : 26.
NEOCOCCIDEA Bodenheimer, 1952 : 317.
NEOCOCCOIDEA Borchsenius, 1950*b* : 14.
NEOCOCCOMORPHA Borchsenius, 1965 : 362.
PALEOCOCCOIDEA Borchsenius 1950*b* : 14. This name has no relationship to *Palaeococcus* Cockerell, 1894.

PALEOCOCCOMORPHA Borchsenius, 1965 : 362.
PETALASPIDIOTINA Theim & Gerneck, 1934 : 230.
PHYTADELGES Duméril, 1806 : 269.
PHYTATHELGI Amyot & Serville, 1843 : 618.
PROBOSCIDIA Woodworth, 1915 : 121.
PSEUDOPTERES Amyot, 1847 : 488.
SCHRADERIAE Fuller, 1897*b* : 1345.
TOUMEYELLINI Berry, 1959 : 198. This is obviously a *lapsus* for the generic name *Toumeyella* Cockerell, and is without nomenclatorial standing. A group name formed from the genus *Toumeyella* is probably needed, nevertheless.

## REFERENCES

The coding to the references cited in the text is taken from MORRISON, H. & RENK, A. V. 1957. A Selected Bibliography of the Coccoidea. *Misc. Publs U.S. Dep. Agric.* **734** : 222 pp., and MORRISON, H. & MORRISON, E. 1965. A Selected Bibliography of the Coccoidea, First Supplement. *Misc. Publs U.S. Dep. Agric.* **987** : 44 pp. Only those references not mentioned in these two publications are listed underneath.

Certain family-group names have been credited to Enderlein, 1920 by some authors. This reference is in the second edition of Brohmer's *Fauna von Deutschland*. The first edition was published in 1914 and names have been checked from this source. Thanks are due to Professor Z. Kawecki of the Agricultural University (S.G.G.W.), Warsaw who kindly supplied photocopies of the Coccoidea sections in both these editions.

ACLOQUE, A. 1897. *Faune de France*. Orthoptères, &c. 516 pp. Paris.

AMYOT, C. J. B. & SERVILLE, A. 1843. *Histoire Naturelle des Insectes*. Hémiptères. pp. I–LXXVI, 1–676. 1–6. Paris.

BALACHOWSKY, A. S. 1968. Sur une nouvelle sous-tribu de Lepidosaphedini (Coccoidea—Diaspididae) créée par la découverte d'un nouveau genre nuisible au Caféier d'Arabie à Sao-Tomé. *Revue Zool. Bot. afr.* **78** : 53–63.

BEIER, M. 1938. *In* KÜKENTHAL, W., *Handbuch der Zoologie. Eine Naturgeschichte* der *Stämme des Tierreichs*. Insecta **3**, **4**(2). Berlin.

BORCHSENIUS, N. S. 1963. [On the Revision of the Genus *Lepidosaphes* Shimer (Coccoidea, Homoptera, Insecta)]. *Zool. Zh.* **42** : 1161–1174.

—— 1965. [Essay on the Classification of the Armored Scale Insects (Homoptera, Coccoidea, Diaspididae)]. *Ent. Obozr.* **44** : 362–376.

BROWN, S. W. 1965. Chromosomal Survey of the Armored and Palm Scale Insects (Coccoidea: Diaspididae and Phoenicococcidae) *Hilgardia* **36** : 189–294.

BRUES, C. T. & MELANDER, A. L. 1932. Classification of Insects. *Bull. Mus. comp. Zool. Harv.* **73** : 127–134.

CHENU, J. C. 1875. *Encyclopédie Histoire Naturelle*. Table Alphabétique des Noms vulgaires et scientifiques—Annelés. pp. 1–68. Paris.

CHOU, I. 1963. Some Viewpoints about Insect Taxonomy. *Acta ent. sin.* **12** : 586–596.

CRAMPTON, G. C. 1916. The Lines of Descent of the Lower Pterygotan Insects, with Notes on the Relationships of the other forms. *Ent. News* **27** : 297–307.

CRAWFORD, F. S. 1890. Notes on Bulletin 21. *Insect Life, Wash.* **3** : 76.

DUMÉRIL, A. M. C. 1806. *Zoologie Analytique ou Méthode Naturelle de Classification des Animaux* &c. . . pp. I–XXXIII, 1–334. Paris.

ENDERLEIN, G. 1914. *In* BROHMER, P. *Fauna von Deutschland. Eine Bestimmungsbuch unserer heimischen Tierwelt.* I. ed. III. Coccoidea. pp. 369–370. Leipzig.

FALLÉN, C. FR. 1814. *Specimen Novam Hemiptera Disponendi Methodum Exhibens.* Lundae.

GILIOMEE, J. H. 1967. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera: Coccoidea). *Bull. Br. Mus. nat. Hist.* (Ent.), Suppl. **7** : 1–168.

GILIOMEE, J. H. & MUNTING, J. 1968. A New Species of *Asterolecanium* Targ. (Homoptera: Coccoidea: Asterolecaniidae) from South Africa. *J. ent. Soc. sth. Afr.* **31** : 221–229.

HANDLIRSCH, A. 1903. Zur Phylogenie der Hexapoden. *Sber. Akad. Wiss. Wien* **112** : 716–738.

—— 1925. Unterordnung: Coccides Leach (Schildläuse). Systematische Übersicht (Schluss). *In* SCHRÖDER, C. *Handbuch der Entomologie.* III. 1201 pp. 1040 figs. Jena.

HEYMONS, R. 1907. Die verschiedenen Formen der Insectenmetamorphose. *Ergeb. Fortschr. Zool.* **1** : 137–188.

—— 1915. Vierfüssler, Insekten und Spinnenkerfe. *In* BREHM, *Tierleben.* **4.** Aufl. Leipsig.

HOY, J. M. 1963. A Catalogue of the Eriococcidae (Homoptera: Coccoidea) of the World. *Bull. N.Z. Dep. scient. ind. Res.* **150** : 1–260.

JAKUBSKI, A. W. 1965. *A Critical Revision of the Families Margarodidae and Termitococcidae (Hemiptera, Coccoidea).* British Museum (Nat. Hist.). pp. i–x, 1–187. London.

KOSZTARAB, M. 1968. Cryptococcidae, A New Family of the Coccoidea (Homoptera). *Va J. Sci.* **19** : 12.

KRAUSSE, A. & WOLFF, M. 1919. Eine Übersicht über die bisher aufgestellten fossilen und rezenten Insektenordnungen. *Arch. Naturgesch.* **85A** (3) : 151–171.

LEACH, W. E. 1815. Entomology. *In* BREWSTER, D. *The Edinburgh Encyclopaedia.* pp. 57–172. Edinburgh.

LEUNIS, J. 1860. Synopsis Naturgeschichte des Thierreichs. 2. Aufl. pp. I–LXVI, 1–1014. Hannover.

LINDINGER, L. 1927. Coccidae, Schildläuse. *In* STELLWAAG, F. *Die Weinbauinsekten der Kulturländer Lehr- und Handbuch.* Berlin.

MAXWELL-LEFROY, H. 1909. *Indian Insect Life, A Manual of the Insects of the Plains (Tropical India)* Agricultural Research Institute, Pusa. pp. I–XII, 1–786. Calcutta and Simla.

MORRISON, H. & MORRISON, E. R. An Annotated List of Generic Names of the Scale Insects (Homoptera: Coccoidea). *Misc. Publs U.S. Dep. Agric.* **1015** : 1–206.

MUNTING, J. & GILIOMEE, J. H. 1967. A new species of *Lecaniodiaspis* Targ. (Homoptera: Asterolecaniidae) from South Africa. *J. ent. Soc. sth. Afr.* **29** : 102–108.

NEWMAN, E. 1834. Attempted Division of British Insects into Natural Orders. *Ent. Mag.* **2** : 379–431.

OBENBERGER, J. 1957. *Entomologie.* III. pp. 1–467. Praha.

SAMOUELLE, G. 1819. *The Entomologist's Useful Compendium; or an Introduction to the Knowledge of British Insects.* pp. 1–496. London.

SCHRADER, H. L. 1863. Ueber gallenbildende Insekten in Australien. *Verh. zool. -bot. Ges. Wien* **13** : 189–192.

BRITISH MUSEUM 10 JUN 1969 NATURAL HISTORY

DOUGLAS JOHN WILLIAMS, B.Sc., Ph.D.
COMMONWEALTH INSTITUTE OF ENTOMOLOGY
c/o BRITISH MUSEUM (NATURAL HISTORY)
CROMWELL ROAD
LONDON. S.W.7

# INDEX TO VOLUME

New taxonomic names and names involved in nomenclature changes are in **bold** type

abbreviata, Rhinocypha biforata . . 308
abdominalis, Gomphus . . . . . 290
aberrans, Hagenius . . . . . 290
abyssinicus, Onychogomphus . . . 290
ACANTHOCOCCUS . . . . . . 318
achaemenesopsis, ♀ form of viola suk, Charaxes . . . . . . . 132
**aciculata, Leptocera (Poecilosomella)** 60 (figs), 61, 62 (fig.), 64 (figs)
ACLERDA . . . . . . . . 318
acraea, Telipna . . . . . . 4
acraea, Telipna acraea . . . . . 4
acraeoides, Telipna . . . . 14, Pl. 3
actinotina, Telipna . . . . . 20
acutus, Ictinus . . . . . . 290
adami, Ceylonosticta . . . . . 308
aethiops, Phyllogomphus . . . . 290
africanus, Echinopterogomphus . . 290
**Agdestis** . . . . . . . . 199
albifascia, ♀ form of viola kirki, Charaxes. 131
albifascia, ♀ form of viola suk, Charaxes . 133
albimacula, ♀ form of viola diversiforma, Charaxes . . . . . . 143, Pl. 18
albistigma, Rhinocypha . . . . . 308
albistyla, Gynacantha . . . . . 300
albocaerulea, ♀ form of viola diversiforma, Charaxes . . . . . . . 143
albofasciata, Telipna . . . . 6, Pl. 1
alladinis, ♀ form of etheocles etheocles, Charaxes . . . . . . . 100
alma, Epallage . . . . . . 306
ambigua, Gomphoides . . . . . 290
amphiclitus, Austrogomphus . . . . 290
anacantha, Austroaeschna . . . . 300
anambae, Rhinocypha biseriata . . . 308
ANCEPASPIS . . . . . . . 319
ANDASPIS . . . . . . . . 319
andersoni, Mnais . . . . . . 304
angeli, Austrogomphus . . . . . 290
angolense, Platycypha caligata . . . 308
angulosus, Ictinus . . . . . . 290
angusticlavius, ♂ form of cynthia cameroonensis, Charaxes . . . . . . 151
**angustifascia, Telipna citrimacula** 8, Pl. 2
angustipennis, Calopteryx (Sylphis) . . 304
angustipennis, Diaphlebia . . . . 290
annaimallaicus, Lamelligomphus nilgiriensis . . . . . . . . 290
annandalei, Micromerus . . . . . 308
annularis, Onychogomphus . . . . 290
annulatus, Heterogomphus . . . . 291
**annulitibia, Leptocera (Poecilosomella)** 60 (fig.), 62 (fig.), 64 (fig.)
ANTAKASPIS . . . . . . . 319
ANTONIA . . . . . . . . 319
AONIDIA . . . . . . . . 319
apicalis, Dichaetomyia . . 269, 286 (figs)
apicalis, Gynacantha . . . . . 300
apicalis, Neurobasis . . . . . 304
APIMORPHA . . . . . . . 319
appendiculatus, Gomphoides . . . . 219
aquicola, Agriogomphus . . . . 219
arbustorum, Austrogomphus . . . . 219
arenarius, Austrogomphus . . . . 219
armageddoni, Chlorocypha . . . . 308
armatus, Dromogomphus . . . . 291
armiger, Austrogomphus . . . . 291
**arrogans, Dichaetomyia** 270–273, 286 (figs)
**aseta, Dichaetomyia** 206 (figs), 260–263, 285 (figs)
ASPIDIELLA . . . . . . . 320
ASPIDIOTUS . . . . . . . 320
ASTEROLECANIUM . . . . . . 320
asthenes, Telephlebia . . . . . 300
atrinervis, Telipna . . . . 11, Pl. 3
atrocyana, Agrion . . . . . . 304
atropha, Vestalis . . . . . . 304
AUGULASPIS . . . . . . . 320
aurantiaca, ♂, ♀ forms of cynthia sabulosus, Charaxes . . . . . . 157, Pl. 25
auricolor, Gomphus . . . . . 291
auriculata, Archipetalia . . . . . 300
aurivillii, Telipna . . . . . 9, Pl. 2
**australis, Dichaetomyia** 204 (figs), 239–242, 283 (figs)
australis, Ictinus . . . . . . 291
AUSTROTACHARDIA . . . . . 320

baileyi, Charaxes . . . 122–124, Pl. 14
bainbriggei, Gynacantha . . . . 300
bakeri, Tetracanthagyna . . . . 300
balica, Euphaea lara . . . . . 306
bangweuluensis, Anax . . . . . 300
basalis, Pseudophaea . . . . . 306
basilactea, Archineura . . . . . 304
**basiviridis,** ♀ form of **viola loandae,** Charaxes . . . . . . 145, Pl. 17
bauri, Closteridia . . . 44, 45 (figs), Pl. 4
beatifica, Rhinocypha perforata . . . 308
beesoni, Rhinocypha . . . . . 308
BEESONIA . . . . . . . . 320
berkeleyi, Charaxes . . . 80, 163 (figs)

beryllae, Vestalis 304
bicolor, Chlorocypha curta 308
bicornutus, Gomphus 291
bidens, Neogomphus 291
bidentatus, Leptogomphus 291
bifenestrata, Rhinocypha 308
bifurcatus, Austrogomphus 291
biharica, Gynacantha 300
**biinclinata, Charaxes etheocles** 102, Pl. 10, 11
**bimacula, Telipna acraea** 5, Pl. 1
bisignatus, Micromerus 308
bison, Ophiogomphus 291
bocki, Euphaea 306
bodkini, Zonophora 291
boliviensis, Leptocera (Limosina) 69
borealis, Progomphus 291
**borealis, Schistocerca intermedia** 31
borikhanensis, Macrogomphus 292
borneensis, Heterogomphus icterops 292
BRACHYSCELIS 321
brainei, Charaxes viola 147, Pl. 17
brevicauda, Telephlebia godeffroyi 300
brevicostata, Leptocera (Limosa) 66
brevipes, Aphylla 292
**breviseta, Dichaetomyia** 218 (figs), 224–228
brevistigma, Cordulegaster (Thecagaster) 299
brunnea, Tetracanthagyna 301
brunettii, Leptocera (Poecilosomella) 60 (fig.), 62 (fig.), 63, 64 (fig.)
burmicus, Microgomphus 292
butoloensis, Notogomphus 292

cacharicus, Lamellogomphus 292
caerulea, Rhinoneura 308
**caerulescens,** ♀ form of **penricei tanganyikae, Charaxes** 80, Pl. 29
caerulescens, ♀ form of viola diversiforma, Charaxes 143
calliope, Gynacantha 301
CALLIPAPPUS 321
calverti, Neuraeschna 301
calverti, Cyclophylla 292
CALYCICOCCUS 321
CALYMMATA 321
camelus, Epigomphus 292
cameroonensis, Charaxes cynthia 151, Pl. 27
cameroonensis, Telipna 11, Pl. 3
camerunensis, Microgomphus 292
campioni, Orogomphus 299
cancellata, Libellago 308
CANCERASPIS 321
carissima, Pseudophaea 306
carnuta, Ptelina 20
carovei, Petalura 300
carpenteri, Charaxes etheocles 108, 161 (figs)
carpenteri, ♀ form of etheocles carpenteri, Charaxes 109–110
carpenteri, Nilogomphus 292
carteri, ♂ form of etheocles etheocles, Charaxes 102
catochrous, ♂ form of etheocles biinclinata Charaxes 106
catochrous, ♂ form of etheocles carpenteri, Charaxes 111–112
catochrous, ♂ form of etheocles etheocles, Charaxes 102
caudalis, Anisogomphus 292
cauvericus, Burmagomphus 292
cedreatis, Charaxes 91
cedreatis, Charaxes cedreatis 85–87, Pl. 1
CEROCOCCUS 321
CEROPLASTES 321
cervus, Heliogomphus 292
ceylonicus, Heterogomphus 292
chanteri, Charaxes viola 133, Pl. 20
chelifera, Gynacantha 301
**chepalungu, Charaxes** 90, 92, Pl. 3
chichibui, Gomphus 292
CHIONASPIS 322
choristopterus, Halmenus 38 (fig.), 41
ciliata, Agrion 304
circularis, Onychogomphus 292
CISSOCOCCUS 322
citrimacula, Telipna citrimacula 7, Pl. 1
COCCOMYTILUS 322
COCCURA 322
COCCUS 322
**coei, Leptocera (Limosina)** 67 (fig.), 69–70
COELOSTOMIDIA 323
coerulescens, Diphlebia euphoeoides 307
cognata, Rhinocypha 308
collessi, Dichaetomyia 206 (figs), 257–260, 283 (figs)
coloratus, Phyllogomphus 292
comitatus, Austrogomphus 292
compar, Euphaea 307
COMSTOCKIELLA 323
CONCHASPIS 323
concinna, Desmopleura 43, Pl. 4
confraternus, Gomphus 292
confusa, Caliphaea 304
**conjugens,** ♀ form of **contrarius, Charaxes** 121, Pl. 13
**conjuncta, Telipna acraea** 5, Pl. 1
conjuncta, ♀ form of etheocles evansi, Charaxes 113
consanguinea, Telipna consanguinea 11, Pl. 5
consimilis, Caliphaea 304
conspersa, Caliaeschna 301
contrarius, Charaxes 119, Pl. 13
contrarius, ♀ form of contrarius, Charaxes 120
cordosa, Chlorocypha dispar 308
cornutus, Crenigomphus 293
coryndoni, ♀ form of viola phaeus, Charaxes 137
**cottrelli,** ♀ form of **viola variata, Charaxes** 140
croceus, Chlorocypha 308

**crosskeyi, Pseudorhynchus** . . . 173 (fig), 174 (fig.), 176 (fig.), 177 (fig.), 183 (fig.), 188–190
Cryptococcus . . . 323
Ctenochiton . . . 323
cuprea, Hetaerina . . . 304
cupreopurpurea, ♀ form of viola diversiforma, Charaxes . . . 144, Pl. 18
curvinervis, Leptocera (Leptocera) . . . 56
cuspidatus, Halmenus . 38 (fig.), 39, 41 (figs)
cyaneofrons, Gomphus . . . 293
cyclops, Telephlebia godeffroyi . . . 301
Cylindrococcus . . . 324
cynthia, Charaxes cynthia . 150, Pl. 22–27
cynthiae, Heliaeschna . . . 301

Dactylopius . . . 324
daria, Charaxes viola . . . 134, Pl. 20
delineatus, Davidius zallorensis . . . 293
demerarae, Cyanogomphus . . . 293
diminutivus, Onychogomphus . . . 293
depuncta, Telipna sanguinea . . . 16, Pl. 4
devillei, Lais . . . 305
dewitzi, ♀ form of etheocles lutacea, Charaxes . . . 90
diadophis, Erpetogomphus . . . 293
Diaspis . . . 324
Dimargarodes . . . 325
dingavani, Onychogomphus . . . 293
distincta, Umma . . . 305
diversiforma, Charaxes viola . . . 141, Pl. 18
diversiforma, ♀ form ov viola diversiforma, Charaxes . . . 143, P. 18
doddi, Austrogomphus . . . 293
donaldi, Anaciaeschna . . . 301
Drosicha . . . 325
druceanus, Charaxes . . . 78
drummondi, Lamellogomphus . . . 293
duarensis, Burmagomphus . . . 293
duaricus, Onychogomphus . . . 293
dundomajoricus, Phyllogomphus . . . 293
dundominusculus, Phyllogomphus . . . 293

echinoccipitalis, Onychogomphus . . . 293
electa, Umma . . . 305
ellioti, Aeshna . . . 301
elongatus, Gomphus . . . 293
elwesi, Notholestes . . . 305
**emdeni, Dichaetomyia** . . . 199
ephyra, ♂ form of etheocles etheocles, Charaxes . . . 101
epophthalmus, Gomphus . . . 293
Eremococcus . . . 325
erica, Telipna . . . 17, Pl. 4
Eriococcus . . . 325
Eriopeltis . . . 325
erythromelas, Aeschna . . . 301
eschatus, Halmenus . . . 42 (figs)
ethelae, Dysphaea . . . 307
etheocles, Charaxes . . . 99
etheocles, Charaxes etheocles . 99–100, Pls 6, 7
Eumargarodes . . . 325
euphoeoides, Diphlebia . . . 307
Eurhizococcus . . . 326
eutainia, Erpetogomphus . . . 293
evansi, Charaxes etheocles . 112–113, Pl. 9
exilis, Gomphus . . . 293

femina, Umma . . . 305
femoralis, Merogomphus . . . 293
Filippia . . . 326
finalis, Micromerus . . . 309
Fiorinia . . . 326
flavicolor, Heterogomphus . . . 293
flavifrons, Notogomphus . . . 293
flavifrons, Onychogomphus . . . 293
flavohirta, Dichaetomyia . 205 (figs), 248–251, 284 (fig.)
flavomaculata, Austroaeshna parvistigma . 301
fletcheri, Gomphidia . . . 293
fletcheri, Petaliaeschna . . . 301
folia, Cordulegaster brevistigma . . . 299
forcipata, Planaeschna . . . 301
fraseri, Ictinogomphus . . . 293
frontalis, Onychogomphus . . . 294
frontalis, Rhinocypha . . . 309
fucata, Leptocera (Limosina) . . . 57 (figs)
fujiacus, Gomphus . . . 294
fujiama, Davidius . . . 294
fulgens, ♀ form of etheocles etheocles, Charaxes . . . 101
fulgida, Lais . . . 305
**fulvohirta, Dichaetomyia** . . 205 (figs), 255–257, 284 (figs)
fumosa, Sapho . . . 305
fungicola, Leptocera (Limosina) . . . 68
Furcaspis . . . 326
furculisterna, Leptocera (Limosina) . 71, 72 (fig.)
fuscoirroratus, Sphingonotus . 47, 48 (figs), 49–50, Pl. 6
**fusconotata, Dichaetomyia** . . 208 (figs), 265 (figs), 266–268, 285 (figs)

gigantica, Anotogaster . . . 299
gloriosa, Dysphaea . . . 307
gloriosa, Sapho . . . 305
godmani, Cordulegaster . . . 299
**grahamei, Charaxes** . . 115–117, Pl. 12
greeni, Micromerus . . . 309
greenwayi, Platycypha . . . 309
**guineensis, Charaxes** . . 150, Pls 22–27
Gymnaspis . . . 326
gynostylus, Cyclogomphus . . . 294

HALIMOCOCCUS 326
handeri, ♀ form of viola kirki, Charaxes 131
hannyngtoni, Heterogomphus 294
hardyi, Austroaeschna 301
hasimaricus, Burmagomphus 294
hastifer, Pseudorhynchus 173 (fig.), 174 (fig.), 176 (fig.), 177 (figs), 186–187
hauxwelli, Lais 305
**helomyzina, Spilogaster** 214
hemihyalina, Rhinocypha quadrimaculata 309
henryi, Mesogomphus 294
hermionae, Allogaster 299
hetaerinoides, Leucopteryx 305
heterostylus, Cyclogomphus 294
hilaryae, Rhinocypha 309
**himalayensis, Leptocera (Poecilosomella)** 60 (figs), 61–62 (fig.), 64 (fig.)
hirtula, Leptocera (Coproica) 73
hollandi, Telipna 13, Pl. 3
HOWARDIA 326
huonensis, Anaciaeschna 301
**hyalina, Schistocerca literosa** 35
hybridoides, Diphlebia 307

ICERYA 327
icteroptera, Mnais 305
immisericors, Notogomphus 294
impar, Dichaetomyia 219
imperatrix, Lais 305
inarmata, Neuraeschna 301
incisura, Gyancantha 301
inclitus, Leptogomphus 294
indicus, Micromerus lineatus 309
**inexpectata,** form of **etheocles lutacea, Charaxes** 88
infecta, Hetaerina 305
ingentissima, Petalura 300
inglisi, Lamellogomphus 294
inyangae, Platycypha fitzsimonsi 309
**instabilis,** ♀ form of **viola loanda, Charaxes** 146, Pl. 17
insularis, Burmagomphus vermicularis 294
**intermedia, Schistocerca** 31
intermedia, form of viola suk, Charaxes 133
intersedens, Austroaeschna 301

**ja, Telipna** 11
jacksoni, Chlorocypha 309
javana, Melanocypha snellemani 309
jefferyi, Telipna aurivillii 9, Pl. 2
johannis, Dichaetomyia 210, 282 (figs)

kalarensis, Heliogomphus 294
kali, Bayadera 307
katangae, Telipna 19, Pl. 15
kayonza, Telipna 14, Pl. 4
kelle, Telipna 13, Pl. 3
KERMES 327
KERMOCOCCUS 327
kerri, Macrogomphus 294
KERRIA 327
khasiaca, Gynacantha 302
kheili, Charaxes 94–96, Pl. 5
**kilimensis, Charaxes xiphares** 82–84, Pl. 28
kimminsi, Chlorogomphus 299
kimminsi, Gomphoides 294
kinduana, Charaxes cynthia 153, Pl. 26
kirki, Charaxes viola 130, Pl. 16
kirki, ♀ form of viola kirki, Charaxes 130–131
kirkoides, ♀ form of viola suk, Charaxes 132
klossi, Anotogaster 299
kodaguensis, Gomphidia 294
koningsbergeri, Leptocera (Leptocera) 57
kumaonensis, Davidius 294
KUWANASPIS 328
KUWANIA 328

LACCIFER 328
**lacteata,** ♀ form of **grahamei, Charaxes** 117
laidlawi, Rhinocypha 309
laidlawi, Burmagomphus 294
laidlawi, Euphaea 307
lanceolatus, Pseudorhynchus 173 (fig.), 175–176 (fig.), 177 (fig.), 183 (fig.)
laosica, Calopteryx 305
lateralis, Hemigomphus 294
LECANIUM 328
LECANODIASPIS 329
lecythus, Notogomphus 294
LEPIDOSAPHES 329
lestoides, Amphipteryx 307
LEUCASPIS 329
LEUCODIASPIS 330
libyana, Gynacantha 301
lieftincki, Heliogomphus 294
lilliputians, Microgomphus 295
lindgreni, Onychogomphus 295
literosa, Schistocerca 35, 36 (figs), 37, Pl. 2
lividus, Gomphus 295
LLAVEIA 330
**loandae, Charaxes viola** 144, Pl. 17
**loandae,** ♀ form of **viola loandae, Charaxes** 145, Pl. 17
lombockensis, Euphaea lara 307
lombockensis, Libellago 309
longfieldae, Coryphaeschna 302
longfieldae, Heliaeschna 302
longicauda, Bayadera 307
longinervis, Leptocera (Poecilosomella) 59
longiseta, Dichaetomyia 212, 280 (figs)
longistigma, Indogomphus 295
longus, Notogomphus rueppeli 295
loogali, Microgomphus 295
loringae, Philoganga 307
lotti, Telipna 12, Pl. 3
**lutacea, Charaxes etheocles** 85

lutea, Leptocera (Limosina) 66
**luteohirta, Dichaetomyia** 251
lyttoni, Gynacantha 302

maacki, Gomphus 295
maclachlani, Fonscolombia 302
maclachlani, Gomphidia 295
maclachlani, Onychogomphus 295
maculatus, Cordulegaster 299
madi, Gomphidia 295
**mafuga, Charaxes** 97–98
magnus, Paragomphus 295
malabarensis, Lamellogomphus 295
malayanus, Acrogomphus 295
malloryi, Davidius 295
mandarinus, Psolodesmus 305
manifestus, Austrogomphus 295
MARCHALINA 330
MARGARODES 330
marginatis, Copromyza (Borborillus) 56
**mariae, Telipna** 16
martini, Davidioides 295
**masaba, Charaxes berkeleyi** 82, Pl. 29
MATSUCOCCUS 331
maxima, Hetaerina 305
medjensis, Telipna 16, Pl. 5
megophthalma, Dichaetomyia 238–239
melaleucae, Austrogomphus 295
MELANASPIS 331
melania, Vestalis 305
melanocera, Schisotcerca 31–32, 33 (figs), 34–35, Pl. 1
**meridionalis, Pseudorhynchus pungens** 177 (fig.), 183 (fig.), 185–186
m-flavum, Onychogomphus 295
MICROCOCCUS 331
millardi, Gynacantha 302
milnei, Austroaeschna 302
minor, Acrogomphus 295
minuscula, Aeschna 302
minusculus, Cyclogomphus 296
mirabilis, Leptocera (Limosina) 65
moesta, Leptocera (Limosina) 66
moka, Paragomphus 296
monochroa, Rhinocypha 309
MONOPHLEBULUS 331
monorbiseta, Leptocera (Limosina) 71, 72 (figs)
montanus, Phyllogomphus 296
moultoni, Rhinocypha 309
moundi, Phyllogomphus 296
**mukuyu, Charaxes cynthia** 158, Pl. 23
multinervosa, Diphlebia 307
MYTILASPIS 331
MYTILOCOCCUS 332

neavei, Telipna citrimacula 8, Pl. 2
NEOMARGARODES 332
**nepalensis, Leptocera (Poecilosomella)** 60 (fig.), 62 (fig.), 63, 64 (fig.)
**ngonga,** ♀ form of **berkeleyi, Charaxes** 80, Pl. 29
nigeriensis, Acanthagyna 302
nigrescens, Onychogomphus 296
nigrescens, Vestalis 305
nigricolor, Hagenius 296
**nigrita, Telipna acraea** 5, Pl. 1
nigrolimbata, Leptocera (Leptocera) 56
nigrolineatus, Anax 302
nilgiriensis, Onchogomphus biforceps 296
nipalensis, Cordulegaster (Anotogaster) 299
nocturnalis, Periaeschna 302
norrisi, Dichaetomyia 213, 280 (figs)
northcotti, Charaxes 96
nyanza, Telipna 17, Pl. 4
nyasicus, Paragomphus 296
nymphoides, Diphlebia 307

oberthuri, Calopteryx 305
obliqua, Leptocera (Trachyopella) 72
obscura, Cyclophylla 296
**obudoensis, Charaxes acuminatus** 77, Pl. 28
occidens, Charaxes pythodoris 79
occidentalis, Austrogomphus 296
occidentalis, Phyllogomphus 296
occipitalis, Gomphus 296
ochracea, Charaxes etheocles 106
ochracea, ♀ form of etheocles ochracea, Charaxes 106–107
ochremaculata, ♀ form of viola diversiforma, Charaxes 143, Pl. 18
ODONASPIS 332
odoneli, Gomphus 296
olivaceus, Gomphus 296
olympicus, Chlorogomphus 299
ophibolus, Erpetogomphus 296
orichalcea, Sapho 306
orientalis, Phyllogomphus 296
orites, Anisogomphus 296
ornata, Pseudophaea 307
ornithocephala, Aeschna 302
ORTHEZIA 322

PALAEOCOCCUS 322
palampurensis, Anotogaster basalis 299
pallidimacula, ♀ form of etheocles carpenteri, Charaxes 110–111
pallidiventris, Sphaerocera (Lotobia) 56
papaverina, Hetaerina 306
**PARALECANIINI** 333
PARALECANIUM 333
paraminima, Leptocera (Limosina) 68
paranigrolimbata, Leptocera (Leptocera) 57
**parimpar, Dichaetomyia** 218 (figs), 219–224, 223 (figs), 281 (figs)
PARLATOREOPSIS 333
PARLATORIA 333

parva, Ptelina carnuta . . . . . 20
parvicaudatus, Charaxes cynthia 154–155, Pl. 24
**parviseta, Dichaetomyia** . 218 (fig.), 228–230, 281 (fig.)
parvulus, Gomphus . . . . . 296
patricia, Phyllopetalia . . . . . 302
pelops, Rhinocypha . . . . . 309
pendleburyi, Leptogomphus . . . . 297
penricei tanganyikae, Charaxes . . . 80
perrensi, Aeschna . . . . . . . 302
**personata, Dichaetomyia rufa** . . . 242
pestilens, Hypopetalia . . . . . 302
**petersi, Charaxes** . . . . 121, Pl. 13
phaeus, Charaxes viola . . . . 136, Pl. 21
phaeus, ♀ form of viola phaeus, Charaxes . 137
PHENACASPIS . . . . . . . 333
PHENACOCCUS . . . . . . . 333
PHENACOLEACHIA . . . . . . . 333
PHOENICOCOCCUS . . . . . . . 334
PHYSOKERMES . . . . . . . 334
picta, Charaxes viola . . . . . 306
pilula, Hetaerina . . . . . . . 306
pinheyi, Nepogomphoides . . . . 297
PITYOCOCCUS . . . . . . . 334
plagiata, Gynacantha . . . . . 302
plagiata, Telipna . . . . . 15, Pl. 4
plagiatus, Gomphus . . . . . 297
PLANOCOCCUS . . . . . . . 334
platyceps, Gomphidia . . . . . 297
PLATYCOELOSTOMA . . . . . . 334
POLLINIA . . . . . . . . 334
PORPHYROPHORA . . . . . . . 335
praetorius, Gomphus . . . . . 297
prasinus, Austrogomphus . . . . 297
preciosus, Chlorogomphus . . . . 299
**primitiva,** ♀ form of **viola loandae, Charaxes** . . . . 144, Pl. 17
producta, Neuraeschna . . . . . 302
propinqua, Charaxes cynthia . . . 155, Pl. 23
protocedreatis, ♀ form of etheocles lutacea, Charaxes . . . . . . . . 87
**protokirki,** ♀ form of **viola loandae, Charaxes** . . . . 145, Pl. 17
pruinans, Heliogomphus . . . . 297
pryeri, Gomphus . . . . . . . 297
PSEUDAONIDIA . . . . . . . 335
pseudimpudica, Leptocera (Opacifrons) 57, 58 (figs)
pseudocarpenteri, ♀ form of baileyi, Charaxes . . . . . . . 124
PSEUDOCOCCUS . . . . . . . 335
pseudosmaragdalis, ♀ form of etheocles lutacea, Charaxes . . . . . 89
pulcherrima, Petalura . . . . . 300
pulcherrimus, Onychogomphus . . . 297
PULVINARIA . . . . . . . . 335
**punctata, Schistocerca literosa** . . 35
punctipennis, Leptocera (Poecilosomella) . 59
pungens, Pseudorhynchus . . 173 (figs), 176 (figs), 177 (figs), 179–181, 183 (figs)
pungens, Pseudorhynchus pungens 177 (fig.), 181–182
purpurea, ♀ form of viola diversiforma, Charaxes . . . . . . . 141
pustulosa, Allopetalia . . . . . 303
pygmaeus, Progomphus . . . . . 297

quadracies, Epigomphus . . . . 297
quadrina, Gyancantha . . . . . 303

radix, Chlorocypha glauca . . . . 309
regalis, ♀ form of etheocles etheocles, Charaxes . . . . . . . . 101
reversa, Dichaetomyia . 205 (figs), 206 (figs), 251–255, 284 (figs)
**RHIZOECINI** . . . . . . . 335
RHIZOECUS . . . . . . . . 335
risi, Gomphus . . . . . . . 297
risi, Gynacantha . . . . . . . 303
risi, Leptogomphus . . . . . 297
risi, Mesogomphus . . . . . . 297
robusta, Halmenus . . . 39, 40 (figs)
**robustus, Pseudorhynchus** . . 173 (figs), 174 (fig.), 176 (fig.), 177 (figs), 183 (figs), 187–188
rogersi, ♀ form of viola kirki, Charaxes . 131
rogersi, Pentila . . . . . . . 21
**rosella,** ♀ form of **viola variata, Charaxes** 140
rothi, Telipna . . . . . 7, Pl. 1
**rothioides, Telipna** . . . . . 9
rudis, Hetaerina . . . . . . . 306
**rufa, Spilogaster** . . . . . 242
**rufaeformis, Dichaetomyia** . . 196 (figs), 204 (figs), 234–238, 282 (figs)
rufescens, Dichaetomyia . . . . 269
rufescens, Micromerus . . . . . 309
rufilabris, Leptocera (Limosina) . . 66
rufilla, Telipna . . . . . 7, Pl. 1
RUGASPIDIOTUS . . . . . . . 336
ruspinoides, Telipna . . . . 19, Pl. 5
rusticatus, Mesogomphus . . . . 297
rutherfordi, Anax . . . . . . 303
ruwenzorica, Diastatomma . . . . 297

sabulosus, Charaxes cynthia . 156–157, Pl. 25
sanguinea, Telipna sanguinea . . 16, Pl. 4
sayi, Cordulegaster . . . . . 300
schmidti, Onychogomphus . . . . 297
schmitzi, Leptocera (Limosina) . . 68
schoutedeni, Charaxes . . . 79, Pl. 29
scissus, Gomphus . . . . . . 297
SCLOPETASPIS . . . . . . . 336
scotias, Aeschna . . . . . . 303
seductus, Macrogomphus . . . . 297

seimundi, Burmagomphus . . . . 297
SELENASPIDUS . . . . . . . 336
selysi, Chlorogomphus . . . . . 300
semiopacus, Micromerus . . . . 310
semirufa, Telipna . . . . . 6, Pl. 1
senchalensis, Davidius aberrans . . . 297
septentrionalis, Hetaerina . . . . 306
seriata, ♀ form of etheocles ochracea,
  Charaxes . . . . . . . . 107
SERROLECANIUM . . . . . . . 336
sevastopuloi, Acanthagyna . . . . 303
sextans, Gynacantha . . . . . 303
sheffieldi, Telipna . . . . . 9, Pl. 2
siamensis, Burmagomphus . . . . 297
significans, Dichaetomyia . . . 196 (fig.),
  214–217, 280 (fig.)
SIGNORETIA . . . . . . . 336
sinuatus, Burmagomphus . . . . 297
sipedon, Erpetogomphus . . . . 297
smaragdina, Calopteryx . . . . . 306
smithi, Heterogomphus . . . . . 298
sobrinus, Gomphus . . . . . 298
sordida, Cyclophylla . . . . . 298
**soror, Dichaetomyia** . 273–276, 286 (figs)
souteri, Microgomphus torquatus . . . 298
spectabilis, Zonophora . . . . . 298
SPHAEROCOCCUS . . . . . . . 337
spinipes, Mydaea . . . . . . 214
**spinuligera, Dichaetomyia** . . . 208 (figs),
  263–266, 264 (figs), 285 (figs)
STEINGELIA . . . . . . . . 337
stevensi, Davidius . . . . . . 298
STICTOCOCCUS . . . . . . . 337
STIGMACOCCUS . . . . . . . 337
striatus, Anax . . . . . . . 303
striatus, Onychogomphus . . . . 298
**striatus, Pseudorhynchus pungens**
  177 (fig.), 182, 183 (fig.)
styx, Onychogomphus nigrescens . . . 298
subhyalina, Ptelina . . . . . . 20
sublimbata, Hetaerina occisa . . . . 306
subnodalis, Pseudophaea . . . . 307
subobtusus, Epigomphus . . . . 298
subplatystyla, Anisopleura . . . . 307
subpupillata, Aeschna . . . . . 303
subtinctipennis, Leptocera (Tachispoda) . 57
suk, Charaxes viola . . . . 132, Pl. 16
sulpitia, Telipna . . . . . 10, Pl. 2
superba, Euphaea . . . . . . 307
superbus, Megalogomphus . . . . 298

TACHARDIA . . . . . . . . 337
TACHARDIELLA . . . . . . . 337
TACHARDINA . . . . . . . 338
tamaracherriensis, Merogomphus longistigma . . . . . . . . 298
TARGIONIA . . . . . . . . 338
tectonis, Charaxes druceanus . . . 78, Pl. 29
tenaculatus, Libyogomphus . . . . 298
tenuis, Chlorocypha . . . . . 310
TERMITOCOCCUS . . . . . . . 338
terraereginae, Dichaetomyia . . 204 (fig.),
  231–234, 282 (figs)
thomassoni, Aeshna . . . . . 298
thoracicus, Macrogomphus . . . . 298
tillyardi, Diphlebia lestoides . . . 308
tillyardi, Telephlebia godeffroyi . . 303
tiomanensis, Devadatta argioides . . 308
titia, Libellula . . . . . . 306
tolteca, Hetaerina . . . . . . 306
tonkinicus, Onychogomphus . . . 298
torquatus, Cyclogomphus . . . . 298
TRABUTINA . . . . . . . . 338
transverstigma, Telipna . . . . 12, Pl. 3
triangulifera, Anaciaeschna . . . . 303
**tricolor,** ♀ form of **viola variata, Charaxes** 140
tryoni, Telephlebia . . . . . 303
tumefactus, Epigomphus . . . . 298
tumens, Cynogomphus . . . . . 298
tumorifer, Anax . . . . . . 303

ugandae, Telipna consanguinea . 19, Pl. 5
ugandica, Heliaeschna . . . . . 303
unifasciata, Periaeschna . . . . 303

vansomereni, ♀ form of viola picta,
  Charaxes . . . . . . . 129
vansoni, ♀ form of viola phaeus, Charaxes . 137
**vansonoides,** ♀ form of **viola loandae,**
  **Charaxes** . . . . . 145, Pl. 17
varians, Leptocera (Poecilosomella) . . 59
**variata, Charaxes viola** . . 138–139
**variata,** form of **viola variata, Charaxes**
  139, Pl. 19
venanigra, Telipna . . . . 11, Pl. 3
vetula, ♀ form of etheocles lutacea,
  Charaxes . . . . . . . 88–89
v-flavum, Burmagomphus . . . . 298
vicaria, Dichaetomyia . 196 (fig.), 204 (figs),
  242–248, 283 (figs)
victoriae, Acanthagyna . . . . . 303
villiersi, Telipna . . . . . 10, Pl. 2
villosipes, Rhinoneura . . . . . 310
viola, Charaxes . . . . . . 125
viola, Charaxes viola . . . 127–128, Pl. 15
**violitincta,** ♀ form of **viola loandae,**
  **Charaxes** . . . . . 145, Pl. 17
viridicaerulea, ♀ form of viola diversiforma,
  Charaxes . . . . . . . . 141
viridior, Paragomphus . . . . . 298
virilis, Charaxes . . . . . . 92–94
vitrinella, Rhinocypha . . . . . 310
vittata, Tetracanthagyna . . . . 304
volsella, Gomphoides . . . . . 299

walli, Dysphaea . . . . . . 307
walli, Heliogomphus . . . . . 299

walli, Onychogomphus . . . . 299
walsinghami, Anax . . . . 304
waterhousei, Tetracanthagyna . . 304
**werneri, Pseudorhynchus pungens** 177 (fig), 184–185
wheeleri, Gomphidictinus . . . 299
whiteheadi, Rhinocypha . . . 310
wilkinsi, Cyclogomphus . . . . 299
williamsoni, Gomphidia . . . . 299
williamsoni, Leptogomphus . . . 299
wynaadicus, Macrogomphus . . . 299

Xanthophthalma . . . . . 338
xanthoptera, Orogomphus . . . 300
Xerophilaspis . . . . . . 338
Xylococcus . . . . . . 339

ypsilon, Cyclogomphus . . . . 299

MUSEUM
27 OCT 1969
NATURAL HISTORY

# A LIST OF SUPPLEMENTS TO THE ENTOMOLOGICAL SERIES OF THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

---

1. MASNER, L. The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Pp. 143. February, 1965. £5.
2. NIXON, G. E. J. A reclassification of the tribe Microgasterini (Hymenoptera: Braconidae). Pp. 284; 348 Text-figures. August, 1965. £6.
3. WATSON, A. A revision of the Ethiopian Drepanidae (Lepidoptera). Pp. 177; 18 plates, 270 Text-figures. August, 1965. £4 4*s*.
4. SANDS, W. A. A revision of the Termite Subfamily Nasutitermitinae (Isoptera, Termitidae) from the Ethiopian Region. Pp. 172; 500 Text-figures. October, 1965. £3 5*s*.
5. AHMAD, I. The Leptocorisinae (Heteroptera: Alydidae) of the World. Pp. 156; 475 Text-figures. November, 1965. £2 15*s*.
6. OKADA, T. Diptera from Nepal. Cryptochaetidae, Diastatidae & Drosophilidae. Pp. 129; 328 Text-figures. May, 1966. £3.
7. GILIOMEE, J. H. Morphology and Taxonomy of Adult Males of the Family Coccidae (Homoptera : Coccoidea). Pp. 168; 43 Text-figures. February, 1967. £3 3*s*.
8. FLETCHER, D. S. A revision of the Ethiopian species and a check list of the world species of *Cleora* (Lepidoptera: Geometridae). Pp. 119; 14 plates, 146 Text-figures, 9 maps. February, 1967. £3 10*s*.
9. HEMMING, A. F. The Generic Names of the Butterflies and their type-species (Lepidoptera : Rhopalocera). Pp. 509. August, 1967. £8 10*s*.
10. STEMPFFER, H. The Genera of the African Lycaenidae (Lepidoptera : Rhopalocera). Pp. 322; 233 Text-figures. Coloured frontispiece. September, 1967. £8.
11. MOUND, L. A. A review of R. S. Bagnall's Thysanoptera Collections. Pp. 184: 82 Text-figures. May, 1968. £4.
12. WATSON, A. The Taxonomy of the Drepaninae represented in China, with an Account of their World Distribution (Lepidoptera : Drepanidae). Pp. 151: 293 Text-figures, 14 plates. November, 1968. £5.
13. AFIFI, S. A. Morphology and Taxonomy of the Adult Males of the families Pseudococcidae and Eriococcidae (Homoptera : Coccoidea). Pp. 210 : 52 Text-figures. December, 1968. £5.

PRINTED IN GREAT BRITAIN BY ADLARD & SON LIMITED, BARTHOLOMEW PRESS, DORKING